QST

Devoted Exclusively to

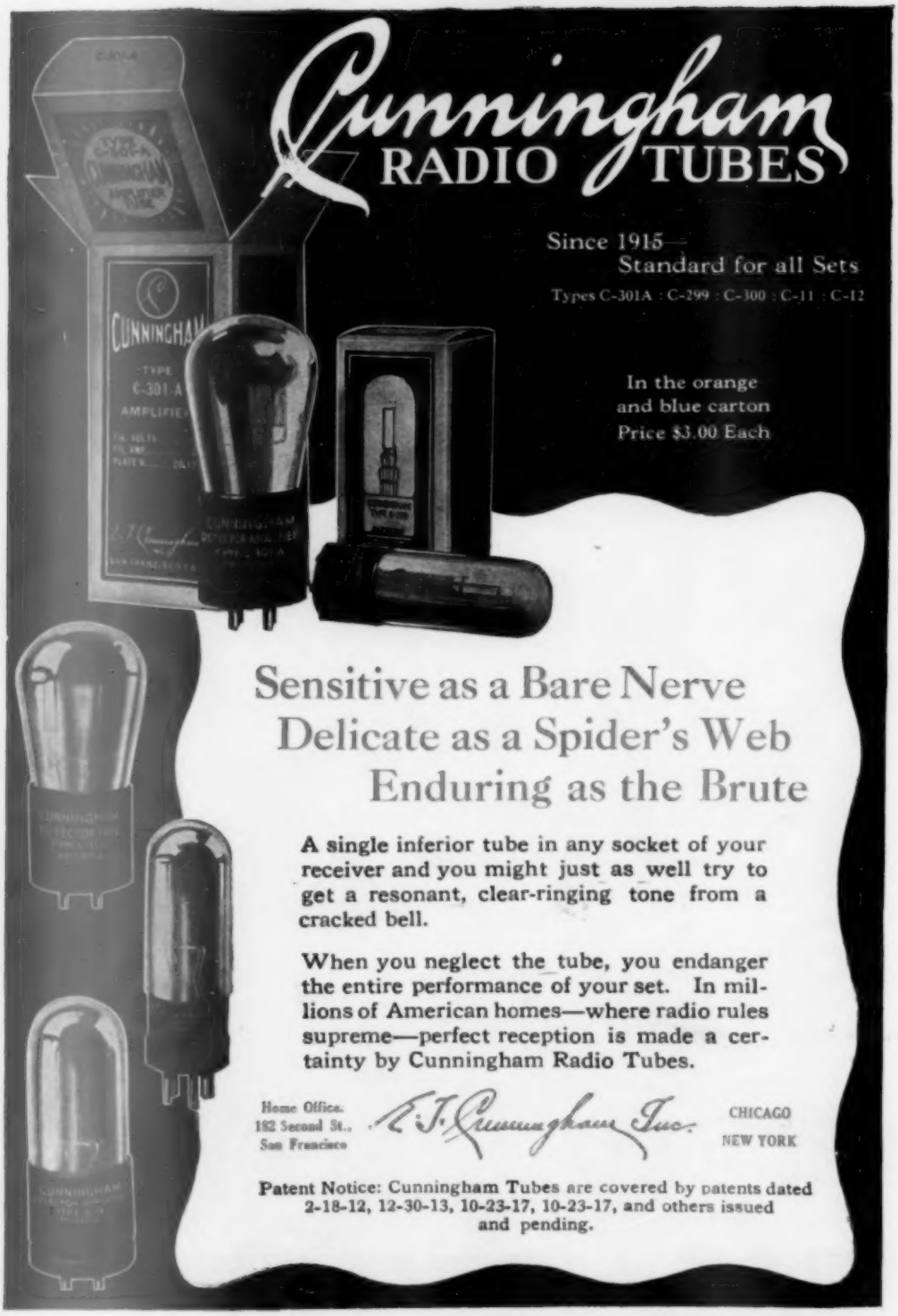
Amateur Radio

Published by The American Radio Relay League

WHO IS WHO

JULY
1925

25¢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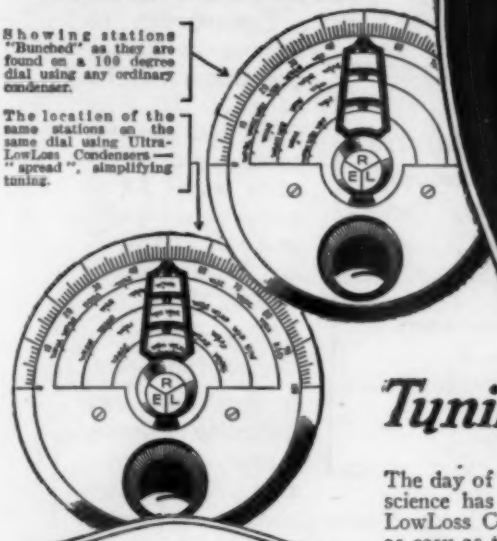

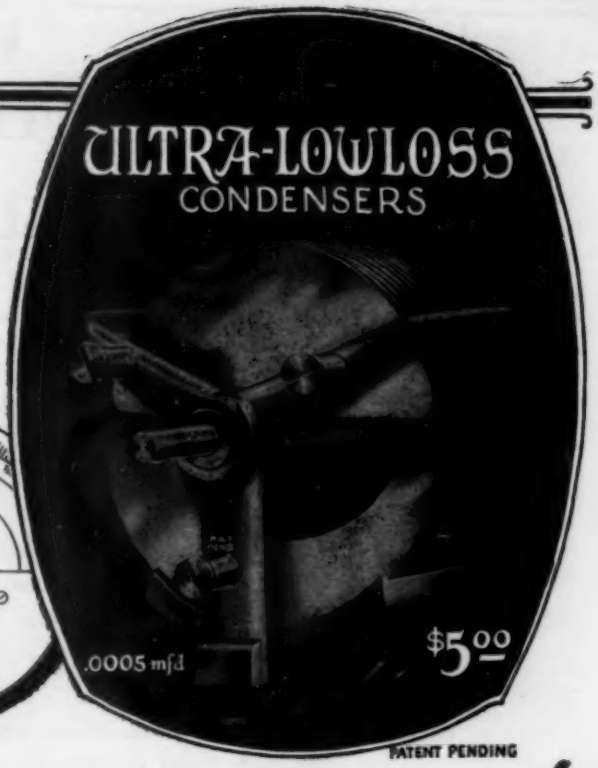

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QST

The Official Organ of the A·R·R·L

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Editor-in-Chief and Business Manager

Robert S. Kruse, Technical Editor

John M. Clayton, Asst. Technical Editor

F. C. Beckley, Managing Editor

Edwin C. Adams, Advertising Manager

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THE AMERICAN RADIO RELAY LEAGUE

The American Radio Relay League, Inc., is a non-commercial association of radio amateurs, bonded for the promotion of interest in amateur radio communication and experimentation, for the relaying of messages by radio, for the advancement of the radio art and of the public welfare, for the representation of the radio amateur in legislative matters, and for the maintenance of fraternalism and a high standard of conduct.

It is an incorporated association without capital stock, chartered under the laws of Connecticut. Its affairs are governed by a Board of Directors, elected every two years by the general membership. The officers are elected or appointed by the Directors. The League is non-commercial and no one commercially engaged in the manufacture, sale or rental of radio apparatus is eligible to membership on its Board.

"Of, by and for the amateur", it numbers within its ranks practically every worth-while amateur in the world and has a history of glorious achievement as the standard-bearer in amateur affairs.

Inquiries regarding membership are solicited. A bona fide interest in amateur radio is the only essential qualification; ownership of a transmitting station and knowledge of the code are not prerequisites. Correspondence should be addressed to the Secretary.

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EDITORIALS

The International Era

THE whole amateur world must take off its hat to Messrs. Maclurcan, a2CM, and Simonds, g2OD, for their wonderful daylight work between Australia and England, reported elsewhere in our columns. Amateur communication between the Antipodes in daylight! "The dream of yesterday is the goal of to-day and the starting point of tomorrow." But the starting point of what? Have we not almost reached the ultimate of amateur accomplishment?

That horrible platitude "Isn't the world a small place after all?" contains nevertheless a very real truth. Amateur radio has made this a tenth-of-a-second globe, and in such a terribly small place we amateurs of the world become more than a collection of national groups—we become at once a single big international family. The name of our family is The International Amateur Radio Union.

It is a very fine thing for us to have our national societies, dealing with the internal affairs of the amateurs in each country, but now that our signals roam everywhere it is necessary for us all to join into a world-wide body that will perform similar functions for us in the international sphere. In consciousness of that fact the amateurs of the world met this spring in Paris and formed the I.A.R.U. It is now no longer the function of any national association to attempt international co-ordination of amateur relations—that is the duty of the I.A.R.U.—and the A.R.R.L. in particular withdraws from the international field which it has been occupying by popular request and becomes definitely a North American organization. It is now thru our I.A.R.U. that we amateurs, in this country and in every other, should handle our growing DX relations. To do this well we must have a strong and healthy Union, representative of us all. Therefore the first thing we need is numbers—membership. The rolls are open and everyone in the wide world interested in amateur radio is invited to join. What do you get for your $1 dues? Let's see:

First you get a green pasteboard membership card that costs about a half cent. Also you get a sense of satisfaction in knowing that you have done your bit to help, that you have thrown your weight to the cause of organized world-wide amateur activity. But you will get some concrete and real benefits, too, for, quoting from the Union's constitution, "it shall be the particular purpose and duty (of the Union) to devise ways and means for the encouragement of international two-way amateur radio communication, by the management of tests and relays, by the promulgation of rules and regulations to co-ordinate international amateur operation, by encouraging and assisting the development of amateur radio in countries where assistance is desirable, by arranging for adequate representation of two-way amateur communication interests at international communication conferences, by endeavoring to secure a removal of legal restrictions prohibiting amateur operation in certain countries, and by kindred methods." In other words, everything that can be thought of to make your enjoyment of international amateur radio work more complete.

The Union is here, the time is at hand, the convenient application blank is on page 47. Do your stuff!

Boost Your Club

IT seems to us that local radio clubs deserve a whole lot more enthusiasm and support than they are getting from most amateurs. The opportunities for a club to serve as a local ham forum have increased immensely in the last few years, but amateurs don't seem to realize this and the clubs all over the country are dwindling in membership and slowly disintegrating. This is a shame.

We need contact with each other so very much now that we are working on different wave-length bands. We must not permit ourselves to become divided into dissociated groups. What with the DX craze and the altogether worth-while trend towards individual experimentation which have come upon us with the advent of low-wave C.W. work, we show a distressing tendency to grew away from the fellowship of the days of the Spark. We must guard against that tendency. *QST* can do much to hold us together, but it is primarily a matter of personal contact, and that means conventions and club meetings. Conventions don't come often enough, but the club can meet every week.

Why this talk about clubs in August when club life is as dead as a burnt-out fifty-watter? Because fall is coming soon, and with it comes the reopening of the clubs. We would like to see the A.R.R.L. bunch all over the country turn out and join local clubs and attend the meetings. When good

hams get together, there is good fellowship, everyone learns the viewpoint of the other fellow, friendships are created, misunderstandings eliminated, co-operation increased, technical problems solved and new information gained; and, most important of all, we will be maintaining that personal contact with each other which is so essential to the spirit of A.R.R.L.

So join a ham club and get out with the gang!

—Kenneth Bryant Warner.

International Intermediates

A—Australia
B—Belgium
BE—Bermuda
BZ—Brazil
C—Canada and Newfoundland
CH—Chile
CR—Costa Rica
D—Denmark
E—Spain Espanol
F—France
G—Great Britain
H—Switzerland (Helvetia)
I—Italy
J—Japan (provisional)
L—Luxembourg
M—Mexico
N—Netherlands
O—South Africa
P—Portugal
Q—Cuba
R—Argentine
S—Scandinavia (Denmark, Finland, Iceland, Norway, Sweden)
U—United States

Financial Statement

IN accordance with instructions of the Board of Directors, the following statement of revenue and expenses of the American Radio Relay League for the three months ended March 31, 1925, is published for the information of the membership.

K. B. WARNER, Secretary.

Statement of Revenue and Expenses
QUARTER ENDED MARCH 31, 1925

REVENUE

Advertising sales	$20,782.45	
Newsdealer sales	21,577.64	
Newspaper syndicate sales	3,135.90	
Dues and subscriptions	11,481.21	
Back numbers, etc.	496.20	
Emblems	281.53	
Interest on bank deposits	108.49	
Bad debts recovered	44.77	
		$58,008.19
Returns and allowances	$ 5,558.77	
Add reserve for returns	1,910.94	
Exchange and collection chgs.	15.97	
Discount 2% for cash	376.46	7,862.14
Net Revenue		$50,146.05

EXPENSES

Publication expense	$19,329.45	
Salaries	14,416.39	
Newspaper syndicate expense	740.74	
Forwarding expense	419.93	
Telegraph, telephone and postage	1,639.70	
Office supplies and general expense	2,562.80	
Rent, light and heat	570.20	
Traveling expense	940.82	
Depreciation on furniture and equipment	129.24	
Bad debts written off	1,927.68	
Traffic Dept. field expense	708.21	
Publicity Dept. field expense	55.34	43,440.50
Net Gain from Operations		$6,705.55

THIRD NATIONAL A.R.R.L. CONVENTION

August 18th, 19th, 20th, 21st, 1925

DEFINITE arrangements have now been completed to hold the *National Convention* at the Edgewater Beach Hotel on the dates mentioned above. All meetings will take place in the hotel, thereby eliminating any confusion.

The hotel management have granted special rates for the members attending, which we give hereunder:

Single rooms, $5.00 per day.
Double rooms, $3.50 each per day.
Three in a room, $3.00 each per day.

Special rates will be given for parties of four and six. All rooms have baths. It is suggested to those who intend to attend they write to the Manager of the Edgewater Beach Hotel, Chicago, Illinois, and make their reservations in advance.

The convention tickets will be $10, including Banquet and all other convention activities. It is earnestly requested that you make reservation early so the committee will know how to plan, and to those who make their reservation before August 8th, a discount of 10% will be allowed, provided the money is sent with the application for reservation. So those who wish to help the committee, write and enclose check or money order to

W. E. Schweitzer, Chairman
4264 Hazel Avenue,
Chicago, Illinois

Strays

The R. C. A. has a few spare copies of the Berne International Call Lists which they will supply to anyone interested for $2.00 per copy. The supply is very limited, though.

———

Howcum the high waves are no good? 2BBX, Bronx, N.Y. was heard in South Africa on January 24 and at the time he had an input of only 22 watts on 160 meters.

JUN 26 1925

Television Arrives

By G. L. Bidwell*

"Dr. Bidwell's article is surprisingly full and accurate, especially in technical detail. I congratulate you."—C. Francis Jenkins.

MOTION PICTURES BY RADIO ARE HERE! I saw them with my own eyes. The present motion pictures are silhouette. That is, they are just black and white pictures without half tones. But the half tones are coming just as sure as the sun will rise tomorrow morning. And then we will see as well as hear broadcasting.

The physical laws back of it are all

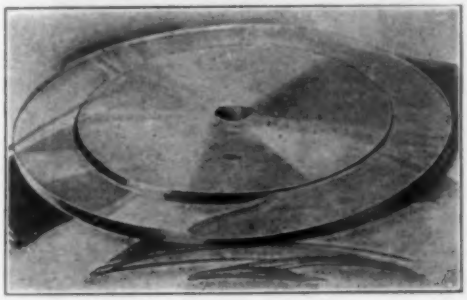


FIG. 1

THE JENKINS PRISMATIC DISC which first made possible high speed picture transmission by wire and radio. The same disc now helps to bring us wire and radio television — and radio moving pictures. When this disc is rotating a light beam sent through its edge is given an oscillating motion.

easily understood and I will try to tell you how it works.

First Pictures, Then Television

In the beginning, C. Francis Jenkins invented pictures-by-radio or telephotography.[1] At first it took twenty minutes to send a picture. Motion pictures would result by simply speeding up so as to receive sixteen separate pictures per second. That was only 19,200 times as fast. He has now accomplished that little feat.

At the sending station is a motion picture projector, a small machine for cutting up the image, a light sensitive cell and a transmitter. At the receiving station is a radio receiver, a small machine to put the picture back together again and a screen (say 6 x 8 inches) upon which the picture appears.

* Atlantic Division Director of the A.R.R.L.

1—See "Visible Radio" by Dan C. Wilkerson, p. 15, May, 1925, *QST*, especially the portion relating to the "high speed" system.

The Picture Speaks

A very interesting thing about this apparatus of Jenkins is that he modulates his carrier wave with voice frequency also and so *speech accompanies the picture with no interference.* You see the picture. It is a Dutch wind-mill with vanes spinning. The loud speaker says: "The mill will now slow down." It slows down. Again: "The mill will now stop." It stops. "The mill will turn backward." It turns backward. After studying the process for two weeks it seemed almost uncanny since the motion picture film and the speaker were ten miles away.

Telephotography First

How does it work? We must first understand telephotography. Place a nickle under a piece of thin paper and draw parallel lines over it with a pencil. The Indian's head appears. A picture may be composed then of lines varying in intensity. By means of a light-sensitive cell passing over the lines these variations in the lines may be transformed into a pul-

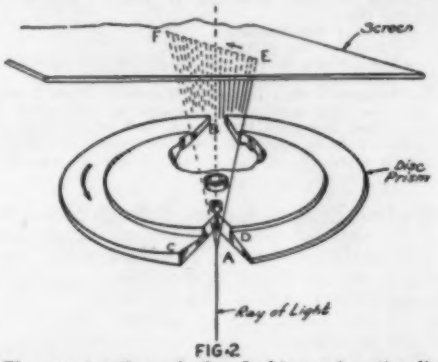


FIG. 2

The construction of the Jenkins prismatic disc. The image oscillates along the path EF.

sating electric current. If the lines be placed end to end, such a current could modulate a carrier wave. This is the way Jenkins does it.

How is this continuous line formed? A prism bends a ray of light. If a lens like a photographic lens be placed in proper position before a picture an image is formed. If a prism be placed near the lens the image will be displaced sidewise a distance depending upon the angle

of the prism. If the prism could change its angle the picture would move. Jenkins has made a prism which does *in effect* change its shape.

As will be seen from Figure 1 this prism is circular in form. At the line across the prismatic section the form changes abruptly. Around the disc the prism changes gradually from form C to form D, Figure 2.

If the disc is caused to revolve, the image moves in a straight line. As the end of the prism passes the lens the picture snaps back *instantaneously* and repeats its journey. This action is shown in Figure 3. A represents the picture; B is a point on the picture; C is a lens throwing an image on screen D; E is the prismatic ring. As the ring revolves through one revolution the image moves down so the image of point B occupies successively points 1, 2, 3, 4, 5, etc., on the screen D. Now if a small hole be made in the screen D the light from point B on the picture will pass through and can be made to operate a light-sensitive cell back of the screen. As the image is caused to move down over the screen by the prismatic ring the aperture

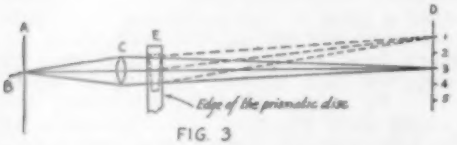


FIG. 3

Diagram to show movement of image by rotating prismatic disc.
A — Picture being sent.
B — Point on the picture.
C — Lens which throws an image on the screen D.
D — Receiving screen.
E — Prismatic ring like that shown in Figs. 1 and 2. As the ring revolves the image of the point B moves along the path 12345 and then snaps back to 1 again. This is repeated for each revolution of the prismatic disc.

will admit light of varying intensity according to the light and shade along a line crossing the picture. The light therefore falling on the photo cell as the image moves across will represent a line from top to bottom of the picture.

How does he get the successive lines that together make up the picture? Very simply. He moves the image along from side to side by means of *another* prismatic ring operating at right angles to the first but very much slower. If 100 lines will give an acceptable picture the first ring makes 100 revolutions and therefore 100 lines while the second one makes one revolution or one trip across the picture. If the aperture cuts out a space equal to one one-hundredth part of the width of the picture it will be seen that the whole picture will be covered when the second disc has made one complete revolution. Or to put it another way the whole picture has

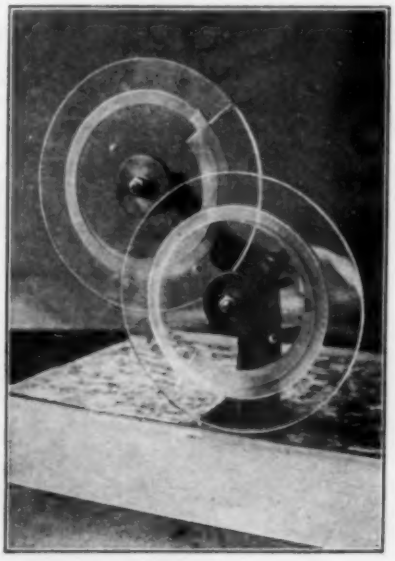


FIG. 4a

A pair of prismatic discs such as are used in high-speed picture transmission.

passed over the aperture bit by bit in an orderly manner. The image will then snap back instantaneously to its position at the beginning and start over again.

A selenium cell or better a thalium oxide cell will change resistance with varying amount of light, sufficiently fast to follow the changes of light and shade. Covering the picture takes twenty minutes with a selenium cell and six minutes with a thalium oxide cell. The current passing

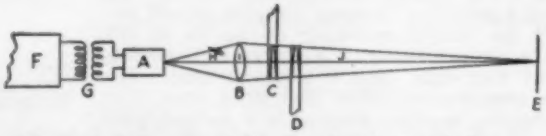


Diagram to show movement of image in two directions by two prismatic discs. Radii of discs C & D passing thru light axis H-I-J are at right angles to each other

F RADIO RECEIVER
G OUTPUT TRANSFORMER
A LAMP
B LENSE
C & D ROTATING PRISMATIC DISCS
E PHOTOGRAPHIC PLATE WHICH RECEIVES THE PICTURE

FIG. 4b

through the cell modulates an oscillator and the varying current is transmitted as a modulated carrier wave.

This wave is received in an ordinary receiver with amplification. Connected by means of a transformer to the plate cir-

FIG. 5a

The light-sensitive potassium cell which converts changing light into changing electric current.

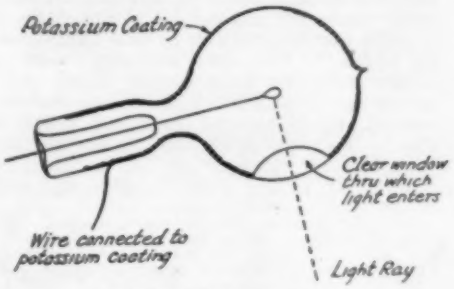


FIG. 5b

The construction of the potassium cell. Light entering through the window releases electrons from the potassium coating on the inside of the glass envelope. Electric current can then flow through the cell. The more light, the more current.

cuit of the last tube, which is a 5-watter, is a lamp. This lamp has a fine coiled filament which will vary in brilliancy with the variations in the received current. This is due to the very small mass of the filament which allows it to cool and heat rapidly as the current varies. Its filament is .6 mil in diameter and the bulb is filled with hydrogen. If this lamp were focussed on a slowly moving photographic film, a line varying in darkness would result. We know that this long line is really 100 lines *end to end* which if placed *side by side* would make the same picture with which we started at the sending station.

Placing these lines together to form a picture is accomplished by a similar pair of prismatic discs as at the transmitter. This is shown in Figure 4.

And Now, Actual Television

What has all this to do with motion pictures by radio? They are the same thing *if* speeded up 19,200 times. Of course there were difficulties and it is the solution of those problems that shows Jenkin's skill in overcoming almost insurmountable difficulties.

Let us discuss a couple of them.

First the light-sensitive cell was slow, far too slow, so a faster one had to be found. His choice fell upon the potassium light-sensitive bulb. This consists of a bulb about the size of an old DeForest audion. It has metallic potassium deposited on the inner surface. The gases are pumped out to a high vacuum. There are two electrodes. One is a wire through the stem ending in a loop in the center of the bulb. The other is through the side of the bulb and connects to the potassium coating. Opposite this last contact is a small space where there is no potassium on the glass, forming a window. If a positive potential be applied to the central electrode and connection made to the potassium coating no current flows as long as no light enters the bulb. Light entering the bulb sets free electrons from the potassium and their number is proportion-

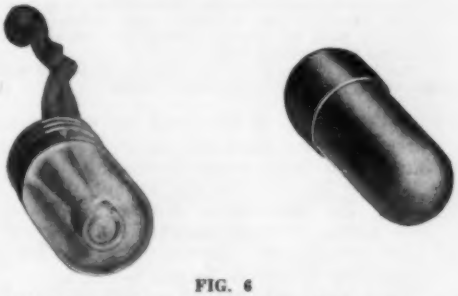


FIG. 6

The Moore-Jenkins lamp that can light and go out again 75,000 times in a second. Its construction is shown in Fig. 7.

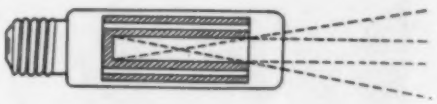


FIG. 7

Cross section of the Moore-Jenkins lamp. The light is produced at the bottom of the central cup.

ate to the amount of light. So it is seen that a current flows through the bulb if light enters the window of the tube and varies absolutely with the variations in the intensity of the beam of light. This cell has no appreciable lag since electrons move with almost incredible speed. This makes this bulb ideal for motion picture work.

The 75,000 Cycle Lamp

Now the lamp at the receiving station must be considered. No filament lamp will vary anywhere near quickly enough for this purpose. A lamp to be satisfactory must go from darkness to maximum brilliancy and back many thousand times per second. The one in use invented by Professor D. McFarlane Moore will handle 100 per-cent modulation *75000 or more times per second.* Again Jenkins puts the ubiquitous electron to work.

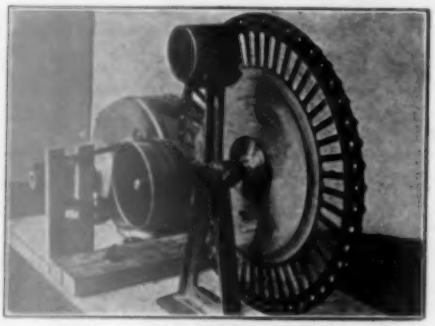


FIG. 8a

THE TRANSMITTER OF THE RADIO-MOVIE OR TELEVISION INSTRUMENT.

The large wheel carries 48 lenses at its rim. When rotating at 2000 r.p.m. it does the work of a prismatic disc running 96,000 r.p.m. — an impossible speed. Although it can hardly be seen in the foto there is a prismatic disc on the same shaft.. The lens-wheel runs fast, the prism disc runs slowly. While the lens-wheel vibrates the light ray rapidly in one direction the prismatic disc moves it slowly back and forth at right angles to this vibration, thus covering the whole picture.

The black cylinder at the top of the frame carries the 75,000 cycle Moore-Jenkins lamp.

This lamp consists of a base and a glass bulb containing two concentric cylinders.

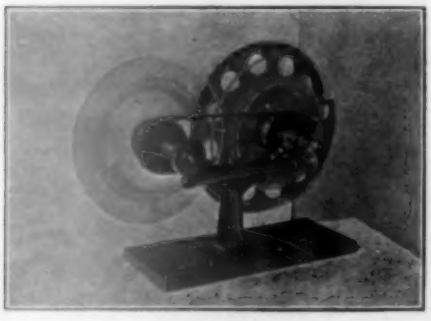


FIG. 8b

LABORATORY WORKING MODEL OF THE LENS WHEEL AND PRISMATIC DISC.

The larger cylinder nearly fills the bulb. The inner one nearly fills the larger one, there being a very small space between them. The inner one has an axial hole drilled nearly to the bottom, forming a deep cup.

This lamp works on the same principle as the Amrad "S" tube. Because electrons in a high vacuum have a long free path they will not conduct current across the narrow space between the cylinders. Current will be carried however by the electrons journeying from the outer cylinder to the bottom of the cup. When the current flows there is a brilliant glow at the bottom of the cup. This lamp conducts about 5 mils when 100 volts are applied. This makes it adapted to the output of 5-watt tubes.

The Sluggish Eye

The human eye viewing an electric spark, lasting, say, one ten-thousandth of a second, sees it for over one-sixteenth of a second. In other words the image in the eye persists for over one-sixteenth second after the cause ceases. The common motion picture is on the screen only half the time since it is interrupted forty-eight times per second by the shutter, yet it looks continuous due to this "persistance of visioh." The time the eye sees an image may be exceedingly short yet it seems to last for at least one-sixteenth second, so if several impulses reach the eye in that length of time we see the combination of them, that is, a composite image. If 10,000 dots of lights and shade are flashed successively on the screen, fast enough, all in proper position to form a picture, we will see the picture. This occurs even though only one dot is on the screen at a time if all these 10,000 dots are flashed on the screen in the space of one-sixteenth of a second. To do this looks like a good sized job but Jenkins has done it.

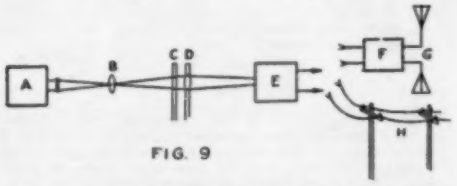


FIG. 9

RADIO (OR WIRE) TRANSMISSION OF MOVING PICTURES.

A — Moving picture projection machine of the usual sort.

B — Lens at the plane of the image.

C — Prismatic disc (see Fig. 8) turning at moderate speed.

D — Lens wheel (see Fig. 8) turning at high speed.

E — The light-sensitive cell (see Figs. 6 and 7) which turns the changing light to changing electric current. This current is fed to the telephone line H if we are using wire transmission. If the pictures are to be sent by radio the currents from E are used to modulate the output of the radio transmitter F and this modulated output is fed to the antenna system G from which it is radiated into the ether.

Consider the two prismatic discs; to get

the whole image on the screen in one-sixteenth of a second the slow disc will have to revolve 16 x 60 or 960 R.P.M. The fast disc would have to revolve one hundred times as fast to form the 100 vertical lines that consitute the picture. This would be at the extreme speed of 96,000 R.P.M. No glass disc could stand this speed. It would fly to pieces from centrifugal force long before this speed was attained, so it was necessary for Jenkins to accomplish the same effect in another way.

Please refer to Figure 4 again. The lens B focusses the image of the lamp A on the photographic plate E. Now if the lens could be made to move horizontally it would carry the image of A across the plate E in a horizontal line. At the same time the slow moving prismatic disc C would slowly move and distribute the lines across the plate vertically. The lens is caused to move so as to make these horizontal lines by having 48 of them attached to a large aluminum disc Fig. 8 rotating in front of the prismatic disc. Since each lens will make a line across the plate (which becomes the screen of the motion picture apparatus) and there are 48 of them, this disc needs only rotate one-forty-eighth of the speed before mentioned. Its speed is therefore 2000 R. P. M.

This disc of lenses thus takes the place of the rapidly rotating prismatic disc D of Figure 4.

Figure 8 shows the disc of lenses and the prismatic disc mounted to run on the same axis but at different speeds.

We are now ready to consider the lay-out for the radio transmission of motion pictures. (See Figure 9).

The picture on a motion picture film is placed in the projector A. For each small picture on the film the prismatic disc at D makes one revolution. This distributes the second image over the light-sensitive potassium bulb at E. The light, varying in

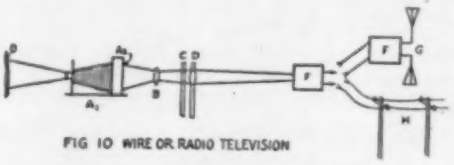


FIG 10 WIRE OR RADIO TELEVISION

RADIO (OR WIRE) TELEVISION.

This differs from Fig. 9 only because we are showing moving objects directly instead of first making movie films of them.

O — The moving object whose image is to be sent.
A1 — Camera pointed at this object.
A2 — Ground glass back of the camera on which appears a small image of the object O.
The rest of the system is exactly like that of Fig. 9.

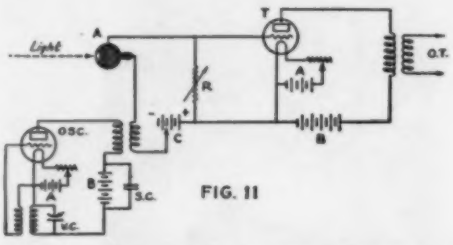


FIG. 11

THE SENDING CIRCUIT OF THE TELEVISION APPARATUS.

A — The light sensitive cell (See Fig. 5a and 5b). The changing resistance of the cell causes the grid bias to change, thereby causing the plate current of the tube T to change in the same fashion as the lights and shadows of the image which the whirling lenses and prisms of Fig. 8 are hurrying past the window of the cell.

Osc. — A 75,000 cycle oscillator which modulates the plate current of the tube T at that frequency. The plate circuit of the tube T now contains the picture modulation and a 75,000 cycle modulation. The 75 k.c. frequency can be regarded as the carrier of the picture.

O.T. — Output transformer which feeds the 75,000 cycle frequency (and the picture it carries) to a line or to a radio transmitter. In either case it will probably be put on a short-wave carrier before being sent out.

A — Filament battery.
B — Plate battery.
C — Grid bias battery.
S C — Shunting condenser.
V C — Oscillator tuning condenser.
R — Variable grid leak.

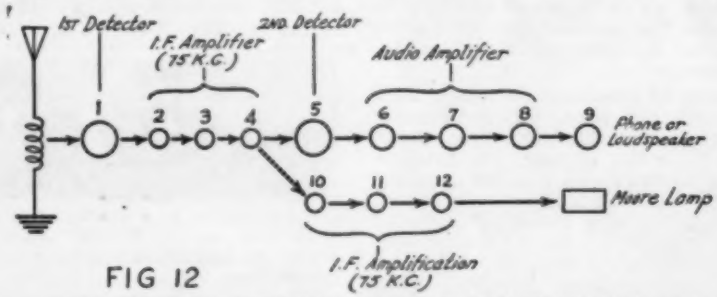


FIG 12

CONVENTIONAL DIAGRAM OF RECEIVING AND AMPLIFYING SYSTEM FOR RECEPTION OF PICTURES AND VOICE SIMULTANEOUSLY

intensity according to the picture, makes a pulsating current in the potassium cell circuit. This modulates a 75 K.C. oscillator which in turn modulates a carrier wave, at present of 1875 K.C.

At the receiving station this moulated wave is received on a set very little different from many in use today. The last amplifier tube is a 5-watter. The modulations in the plate circuit of the last tube are translated into light by the Moore lamp. The ray from this lamp is distributed over the screen by a prismatic disc and lens disc exactly like that at the sending station. The picture appears on a screen only a few inches square. As more powerful lamps are produced the screen can be increased in size.

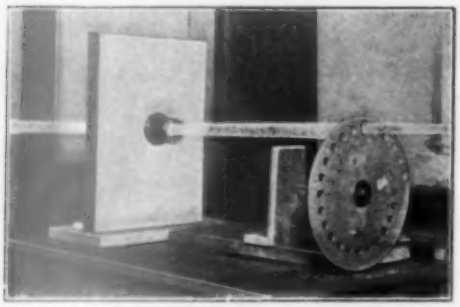


FIG. 13

PART OF TRANSMITTER showing how the beam of light passes through the disc of lenses.

To send a view such as a landscape, a dancer, a prize fight., etc., etc., the projector in Figure 9 would be removed and Lens B focussed so as to throw the view as an image at position C. We then have the arrangement of Figure 10. Otherwise the process is just as described before.

The question of synchronism arises. Jenkins solves this with ease. All these problems look easy after he has solved them. 60-cycle A.C. is the answer. Sixty-cycle A.C. in the various cities is so constant in frequency that it alone is sufficient to keep the sending and receiving discs at exactly the same speed by the use of synchronous motors at all stations. The pictures often need "framing" however. When at the motion picture theatre at the beginning of a reel sometimes the bottom of one picture appears above the top and very soon the operator moves the image up or down and so "frames" the picture. In television such a result is due to the fact that although the discs are rotating at exactly the same speed the end of the prism of the prismatic disc does not pass the ray of light at just the same time as at the sending station. The observer simply turns a knob which momentarily slows or accelerates the discs until the discs at the receiving station come into "Picture phase" with those at the sending station. And so the picture is "framed."

There is little to be said about the radio aspects of television. The following diagram shows how the light cell is connected.

At the receiving station a circuit similar to the superheterodyne is used. The following conventional diagram shows how the picture and sound modulations are separated. It will be noticed that the picture is at 75 K.C. frequency throughout and so can not interfere with broadcasting.

With this public trial of motion pictures by radio a new system of entertainment in the home appears: There seems no reason why, in a comparatively short time, we shall not have radio movies in our own homes.

While all the difficulties are not ironed out the wonderful things Jenkins has done so far promise that they will be.

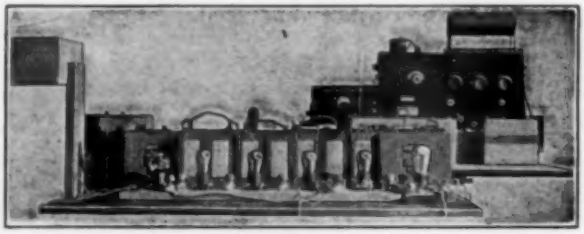


FIG. 14

BALANCE OF THE TRANSMITTER. The beam of light enters the box on the left which contains the light-sensitive cell. This modulates the transmitter through a resistance coupled amplifier.

FIG. 15

THE RECEIVER. Lenses and disc are in the cabinet at the left.

Posted in his laboratory is the following:

"They said it couldn't be done, but he, poor fool, didn't know it, and went ahead and did it."

Shooting Trouble in the Superhet

By John M. Clayton, Asst. Technical Editor QST

A SUPERHETERODYNE receiver which is not operating properly may or may not be as sensitive as a good three tube regenerative receiver—it depends on how really awful the regenerative receiver is! Many people own and operate "supers" and take pleasure in boasting of reception over distances of a thousand miles when the super is operated with an outside aerial, but look surprised when asked what results have been secured with a loop. The idea of a super operating with a loop! Well, folks, that is exactly what a super—a *good* super—is *supposed* to do. If your super has to be operated with an antenna in order to accomplish reception over a distance of a thousand miles you can be sure that either your super is no good, or that you are located in a very thoroughly shielded "pocket" such as a steel building. If the former is the case your super needs a considerable amount of ironing out.

Some Don'ts

Let's start out with a clean slate and eliminate a lot of undesirable things. First of all there is this "second-harmonic" business. If you are using a detector oscillating at twice the working wavelength so that its second harmonic is used to make the intermediate frequency, get rid of it and use a *non*-oscillating detector plus a *separate* oscillator. It takes a radio engineer six months to make a second-harmonic super work, and it always operates with more distortion than a separate oscillator would cause.

Next is the matter of reflexing. The plain superheterodyne is hard enough to put into operation. Why add a hundred per cent more trouble at the start by trying to reflex any of the tubes? Reflex sets are OK when they work, but no two of them work alike. It takes hours and hours of tinkering to do any kind of a reflex job. All manner of reversing of connections and substitution of various by-pass capacities are necessary. When the tubes are finally tied down to the point at which oscillation ceases, nine times out of ten distortion occurs somewhere and we are a lot worse off than we would be if we had forgotten the reflexing and used an additional tube.

Lastly, *don't* try to build a good super using UV-199 tubes. It simply isn't done. Tube after tube will go bad. As the tubes are not designed to handle the power which is generated in and by a good super, the last stage of audio frequency amplification will certainly overload, producing distortion.

Getting Started

Assume that your super is not working at all. It has been assembled according to blue prints, all connections are soldered and are actually making contact, the tubes have been tested and found to be OK, the B batteries are OK and still the set will not make any music.

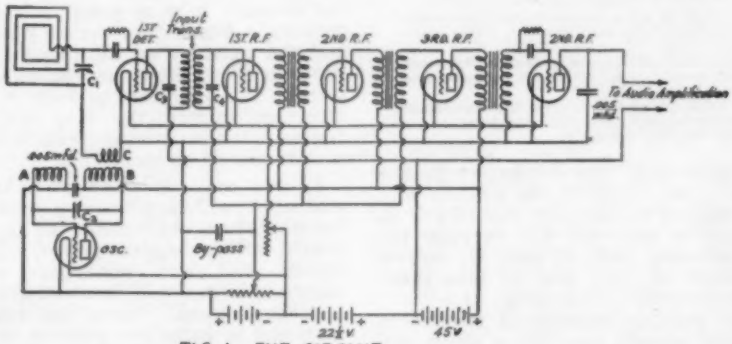


FIG. 1 THE CIRCUIT

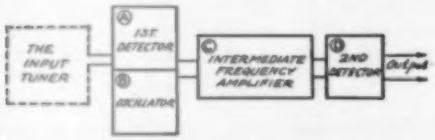
In Fig. 1 there is shown a standard superheterodyne circuit. If yours differs radically from this one be certain that there is some excuse for the difference.

The super can be divided into four component parts, all of which must operate satisfactorily alone before the super, as a whole, can be expected to function. There is an oscillator, a 1st detector, an inter-

mediate frequency amplifier and a second detector in *every* standard superheterodyne (see Fig. 2). Each of these can be tested separately and if there is any trouble it can be readily located.[1]

The Oscillator

The coils A and B of the oscillator inductance (Fig. 3) should be wound in the same direction, and the grid of the oscillator tube should be connected to the *outside* end of coil A and the plate to the *outside* end of coil B. If these connections are reversed the oscillator will not operate and the whole set will be dead. The oscillator tuning condenser C2 is connected across the grid and plate of the oscillator tube. The rotary plates of this condenser must be connected to the plate, otherwise the hand capacity effect will be bad when varying this condenser. The by-pass condenser across the inside ends of coils A and B should have a capacity not less than .005 μfd, and should be mounted as near the coil as possible so



THE PARTS OF A SUPERHETERODYNE RECEIVER
(The proper name of the set is "supersonic heterodyne")

FIG. 2

A – 1st Detector
B – Oscillator

Parts A and B act as a frequency converter, making the short-wave signal into a long-wave signal. The intermediate frequency (or long wave) amplifier is then able to handle this signal.

C – The intermediate frequency (also called supersonic or long wave) amplifier which amplifies the long-wave signal passed to it by A and B.

D – The second detector that converts the long-wave signal into sound and feeds it to the headset, loud speaker or audio amplifier.

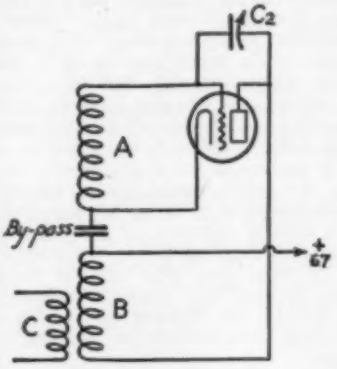
that the leads from the condenser to the coil will be short. Coil C, the pick-up coil, should be coupled to the *plate* end of coil B. If no means is provided for varying the coupling between coils B and C, coil C should consist of only one or two turns wound directly over coil B (Fig. 2).

The only possible sources of trouble in the oscillator circuit are (1) a short circuited or open circuited by-pass condenser. If there is a short on the by-pass condenser, the B battery will also be short circuited. (2) A shorted turn in either coil A, B or C. One shorted turn will quite likely keep the oscillator from oscillating. (3) a high resistance connection in the oscillator tuning condenser or a short circuit in this condenser. The latter condition will also cause a short circuit on the B battery. (4) Loose springs in the tube socket which cause an open circuit or a bad connection between the tube pins and the external circuit. (5) Reversed grid and plate connections.

1—It would be wonderful if this point could be driven home. No matter what ails a set the thing can be found more easily by going after one thing at a time. This goes for transmitters also. don't tear the station down because the tube gets hot, sit down and think it over, then change *one* thing at a time and watch what happens.—Tech. Ed.

The First Detector (Part A, Fig. 2)

The circuit of the first detector is shown in Fig. 4. If you live close to a high-power



THE OSCILLATOR
FIG. 3

broadcasting station it is possible to pick the station up on the loop and the first detector alone. Open the plate circuit of the detector tube at point "x" (Fig. 4) and connect a headset in series with the plate and the primary of the input transformer. Remove all of the tubes except the first detector. By pointing the loop in the proper direction, tuning the loop with the condenser C1 and listening carefully the local station should be picked up.[2]

If you are not close to a broadcasting station it will be necessary to use either a buzzer-driven wavemeter or a homemade source of modulated power. The buzzer-driven coil and condenser combination shown in Fig. 5 will function over the whole broadcast band. Place the coil near the loop and in inductive relation to it, connect the battery to the buzzer and set the shunt (tuning) condenser across the coil (C in Fig. 5) at about one-half maximum capacity.

2—If you are within a couple of miles of a broadcast station of the standard 500-watt sort and cannot hear that station with a headset and a loop, something radical ails the first detector. The tube may be a "dud," the grid condenser or leak may need changing, the input tuner may be all wrong. In any case *get that detector working first*, then proceed with the rest of the set. What's the sense of trying to amplify signals that the first tube did not receive?

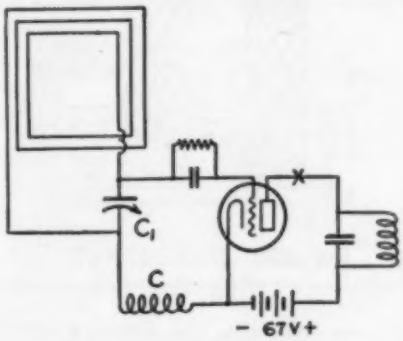
If you use a buzzer tester keep putting it further away from the set until you have a very weak signal and then work on this first detector, attempting to get the greatest sensitivity that you can hold stable. —Tech. Ed.

Now listen with the headset, varying the tuning condenser across the loop (C, Fig. 4). Somewhere near 50 degrees on the dial of the loop tuning condenser the signal from the buzzer should be picked up. If it is not, retune the wavemeter, setting the condenser at a lower capacity, and again try to pick up the buzzer signal in the headset. If it cannot be heard there is some serious trouble in the first detector circuit.

See that the variable condenser C1 is OK. It must not be open or short circuited. The pick-up coil C must not have any shorted turns. The primary of the input transformer must not be open circuited. Test it with a headset and battery. And lastly see that the grid condenser is OK and that the grid leak is of the proper value and is not open or short.

Testing the Detector and Oscillator (Parts A and B, Fig. 2)

When the first detector has been put into operation and the oscillator circuit has been carefully checked and found to be OK, the two can be tested together. Start the buzzer once more. Insert the oscillator tube in its socket and listen, again, in the plate circuit of the first detector. Tune the buzzer signal by means of the loop tuning condenser and then vary the oscillator tuning condenser (C2, Fig. 3). At a certain setting of the oscillator condenser the buzzer signal will become muffled and will sound just as a spark signal sounds when the regenerative control on a regenerative



THE FIRST DETECTOR
FIG. 4

receiver is advanced until the tube oscillates. Check this oscillation condition at both the lower and upper ends of the loop tuning condenser by setting the loop condenser first at 100, varying the buzzer condenser until the buzzer signal is picked up in the headset, and then varying the oscillator condenser until the buzzer signal becomes indistinct and muffled. Then set the loop tuning condenser at about 5 or 6 degrees and repeat the above process, making certain that the oscillator "mushes" the buzzer signal at this condenser setting.[3]

The Intermediate Frequency Amplifier and Second Detector (Parts C and D, Fig. 2)

The intermediate frequency amplifier and the second detector are usually tested at the same time. If the intermediate frequency amplifier is properly wired and if the tubes are OK and the battery voltages correct, there is very little likelihood of trouble (Fig. 5). When the potentiometer slider is

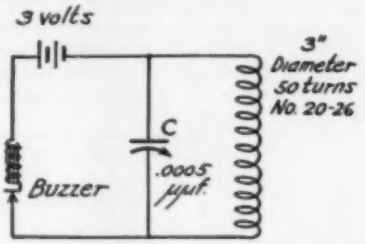


FIG. 5

turned completely to the left (or to the right, depending on how its terminals are wired) the intermediate frequency amplifier will go in to oscillation. This oscillation will generally be accompanied by several long wave telegraph stations, as the coils of the intermediate amplifying transformers are large enough to pick up these high power signals without any antenna.[4]

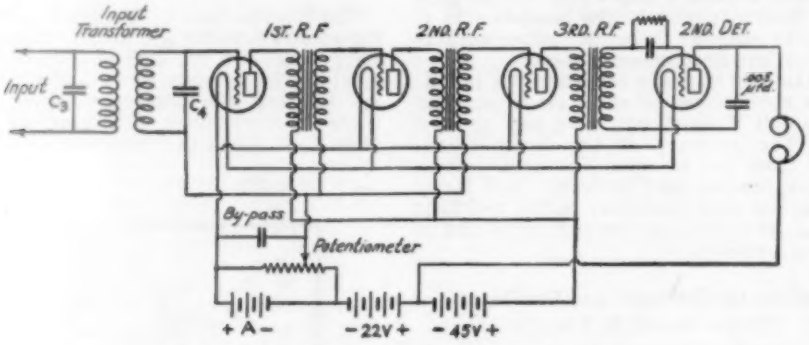
If the amplifier will not oscillate test all of the sockets to see that the tubes make contact with the socket springs. See that none of the connections between the transformers and the sockets are reversed (it is particularly important that the intermediate frequency transformer terminals marked "G" be connected to the *grids* of the tube sockets). See that the condenser C4, Fig. 6, is not open or short circuited and that the by-pass condenser between the potentiometer slider and the positive A battery lead is properly connected and is not open or short. The grid condenser in the grid circuit of the second detector should have a capacity of .00025 μfd and should be used with a grid leak having a resistance from 5 to 10 megohms. A rather large by-pass condenser must be used across the headset (or output circuit and the B battery, as the amount of radio frequency cur-

3—If this effect cannot be obtained over the entire tuning range of the set then one of two things is wrong. A—The tuning range of the oscillator does not agree with that of the input tuner. B—The oscillator does not work over its entire range. Usually the oscillator coils are enough like the tuner secondary that one can guess if the condensers used should cover the same wavelength range.—Tech. Ed.

4—Except in the case of very compact and very well-shielded transformers.—Tech. Ed.

rent in the plate circuit of the second detector is usually quite large. A .002 μfd condenser usually will not be large enough to by-pass all of this R.F.—use a .005 or .006 μfd condenser to start with.

If the amplifier oscillates continually and



THE INTERMEDIATE FREQUENCY AMPLIFIER

FIG. 6

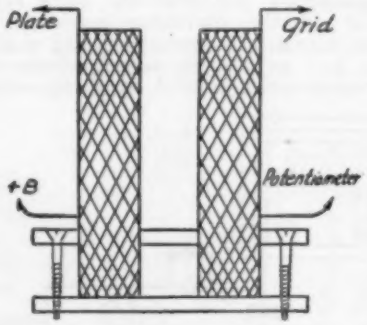
cannot be stopped there are some undesired feedbacks between grid and filament or plate and grid circuits. All of the plate and grid leaks from the transformers to the sockets should be run in as short and direct a manner as possible, taking care, however, not to parallel these leads. The transformers should not be mounted closer than 2 inches from center to center, unless they are enclosed in metallic cases which are connected to each other and to the negative of the A battery.

The Input Transformer

The intermediate frequency amplifier may be operating properly and still it will oscillate if the input transformer is not properly tuned; or if the proper coupling is not provided between the primary and secondary coils.[5]

For a 30 K.C. (10,000 meter) intermediate frequency no better input transformer can be constructed than one having a 1250 turn honeycomb coil in the primary and a similar coil in the secondary circuit (Fig. 6). The outside end of the primary coil should be connected to the plate of the first detector and the outside end of the secondary to the grid of the first radio frequency tube. The coils should be mounted so that the distance between them can be varied up to four inches. This rather loose coupling is not generally required, but under certain conditions the only way in which the proper selectivity can be secured is by loosening the coupling to this extent.

Both primary and secondary coils are shunted by .00025 μfd fixed condensers. This value is rather critical. Do not rely upon the manufacturer's stamping of ".00025 μfd", but try different condensers of this capacity until the correct one is found.[6] A change in this shunt capacity of only 100 μμfd will make a lot of difference in both the signal strength and the selectivity, as will also the coupling between coils.



THE INPUT TRANSFORMER

FIG. 7

The Audio Frequency Amplifier

The headset reception to audio frequency amplification is needed. With a single stage of audio frequency amplifica-

5—There are some superheterodynes that use the same type of I. F. transformer all the way through and still others that use a sharply tuned output transformer instead of a sharply tuned input transformer. The instructions here given can be readily modified by the reader who is dealing with such a set.—Tech. Ed.

6—Most of the small fixed condensers on the market—both paper and mica—have been made to fit the popular demand for a cheap condenser. When one pays for something cheap one generally gets something cheap. In a set so highly expensive as a superheterodyne it is well to order special condensers that are guaranteed to have a capacity within 10% (or less) of their rating. They cost a bit more but why should one save $2 and ruin a $200 set?—Tech. Ed.

tion, the signals from stations within a distance of 500 miles will be uncomfortably loud. For loud speaker volume for the average room a single stage of audio amplification is ample. If greater amplification is desired an additional stage may be added. This stage should be connected in the so-called push-pull fashion using two tubes and two transformers in the one stage. If more than 45 volts are used on the plates of the audio tubes, a C battery

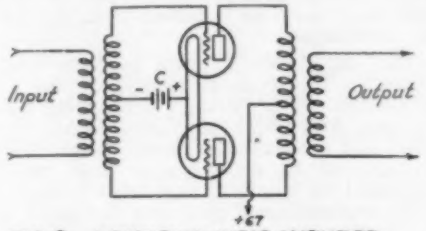


FIG. 8 A PUSH-PULL AUDIO AMPLIFIER

will be needed. This C battery should have a voltage of from 3 to 9, depending on the plate voltage.

Shielding

So far we have not mentioned shielding. Most people (and manufacturers, too) go at the shielding in such a half-hearted fashion that it might just as well be left out of the set entirely. The shielding, to be any good at all, *must* be thoroughly done. It is *not* satisfactory to merely enclose the whole intermediate frequency amplifier in a tin

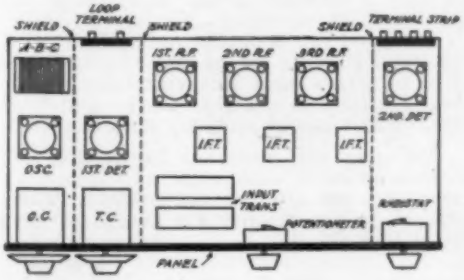


FIG 9

can—each component of the set should be shielded from the rest of the set. (Fig. 9).

The back of the panel, the baseboard, the inside of the cabinet and the top of the cabinet should be covered with a sheet of 12 ounce copper. In addition partitions should be inserted between the oscillator and the first detector; between the first detector and the intermediate frequency amplifier; and between the intermediate frequency amplifier and the second detector. These paritions should extend from the base to the top of the cabinet and from the panel to the inside of the rear of the cabinet. All A and B and potentiometer wires should be run in a "cable" made of flexible wires,

insulated, and laced together with string. The shielding material itself should be used as the negative "lead" of the battery. All connections going to the negative A should be soldered directly to the shielding.

If shielding is done in this manner, the volume and selectivity of the set will be increased fully fifty per cent.

Correction—Reinartz Circuit Not Approved

THE BUREAU of Navigation, Department of Commerce, has directed our attention to the article on page 57 of June *QST* reporting that the Reinartz-Zenith circuit had been approved for amateur transmission, and has advised us that this circuit has not been approved by them. It is the opinion of the Bureau that this circuit *is capable* of being operated so as to comply with the law, but it has not been given blanket approval. If an individual amateur can adjust it so as to produce the effects demanded by law, the Bureau says, its use will be permitted; but if the individual amateur cannot succeed in so adjusting it as to produce the effects of a loosely-coupled transmitter, it may not be used.

In this connection it is well to point out that the circuit is simply a shunt-feed Hartley circuit with capacity coupling to the antenna. The primary circuit is made up of the tube capacities, the two helices and the capacity between these two helices. This last capacity occupies the position of the usual stopping condenser or feed condenser. It also acts as a coupling condenser, being common to both primary and antenna circuit. The small condensers in the antenna and counterpoise leads are most decidedly *not* the coupling condensers as some of our members seem to think. They are simply series condensers. If their capacity is made small the antenna is unable to influence the primary circuit greatly; if they are made larger its capacity is in effect shunted across the feed condenser, therefore the wavelength goes up.

Short Wave Communication With WNP

A. R. R. L. Stations Asked to Maintain Communication with Reinartz on "Bowdoin" on Arctic Expedition

THE familiar call WNP will soon be heard on the air again, when the "Bowdoin" and the "Peary" of the MacMillan Expedition shove off in early July for a summer exploration trip to the north in an effort to locate that vast Arctic continent which is believed to exist between Alaska and the Pole. As already announced in *QST*, Lt. John L. Reinartz, U.S.N.R.F., of 1XAM-1QP, will be Communications Officer of the party and in active charge of the short-wave apparatus.

The "Bowdoin" this year will have a 250-watt short-wave transmitter, operating both on D.C. and 500-cycle C.W. telegraphy and on voice, using wavelengths of about 20, 40, 80 and 180 meters. As last year, there will be messages and press stories coming back home, and amateurs of the A.R.R.L. are requested to endeavor to keep the expedition in contact with civilization. This year's trip will be but a short one, almost a dash into the north and return, so it will be in the time of continual daylight and will provide an excellent opportunity to see what the short waves will do in this respect. Reinartz plans to base his selection of wavelengths and operating hours on the results of tests that will start immediately the "Bowdoin" sails. At present he plans to operate four 3-hour periods every day, beginning at midnight, 6 A.M., noon and 6 P.M., all E.S.T., as the vessel proceeds up the coast. Each period of transmission will start on 40 meters; that will be the stand-by wave at least during the southern half of the passage. When communication is actually established with an amateur station, WNP will want to drop to 20 meters for test; and as she gets farther north it is probable that 20 will be used most of the time. Reinartz does not expect the 80 and 180 meter waves to prove of any value in the daylight conditions to be encountered; he expects on the other hand that it may be found desirable to work as far down as 10 meters. All these wavelengths are approximate—the exact wave in each band has not yet been determined. The hours for regular operation, once the expedition is in the far north, will be those shown by trial to be best.

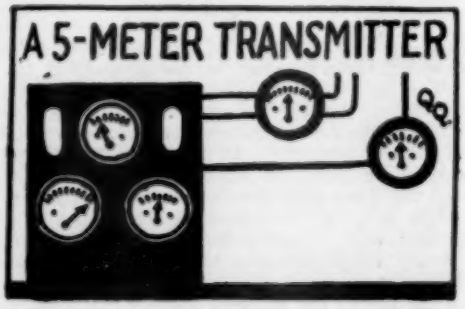
The press stories will be addressed to the National Geographic Society, Washington, D. C., which will distribute them to the newspapers. Amateurs worked direct by Reinartz and receiving a press story from him are requested to wire it by Western Union, night press rates collect, to the Society. Other amateurs intercepting such dispatches are requested to mail or radio a copy to the Society to use as a check on the first reception and in order that they may be credited with assisting the expedition.

The expedition expects to base somewhere in the general region of the last expedition. The "Peary" is carrying three Loening amphibian airplanes, with Navy pilots and mechanics. These planes will be transported to an advance base as far westward as possible, and from there will make exploration flights into the great unexplored area of over a million square miles which is the objective of the trip. The planes, in addition to carrying motion-picture and mapping cameras, are equipped with low-power radiophone sets operating on dry batteries. In spite of this low power, voice from these sets has been heard some 800 miles in daylight. Although intended only to keep the planes in communication with the "Bowdoin," it is possible that they will be heard back in this country.

The Zenith Radio Corporation of Chicago is again supplying the equipment, and it is as a member of the Zenith staff that Reinartz accompanies the party. Mr. E. F. McDonald, Jr., president of Zenith, is also a member of the staff, being one of the aerial observers. As the "Bowdoin" is equipped for 20-meter radiophone work, McDonald hopes to be able to send the Eskimo songs back to civilization, for rebroadcasting on a higher wave—which we must admit would certainly be a knockout.

Reinartz will endeavor to work a different amateur each night and spread his messages out all over the country. There should be opportunity for everyone. Let's keep him QSO!

—*K. B. W.*



The Radio Equipment of the Navy-MacMillan Arctic Expedition

By Henry C. Forbes and John L. Reinartz*

IN MARCH, a conference was held at which K. E. Hassel and H. C. Forbes, engineers of the Zenith Radio Corporation, discussed the radio equipment of the vessels and planes of the forthcoming Navy-MacMillan Arctic Expedition with Don Wallace (Dakota Division Manager, A.R.R.L.), Prof. C. M. Jansky, Jr., (Dakota Division Director, A. R. R. L.), John L. Reinartz, and Elliot Jenkins (formerly of WDAP at the Drake Hotel, Chicago.)

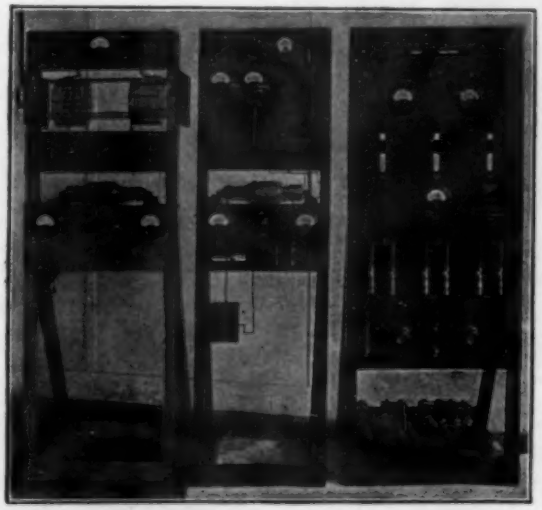
On the basis of this conference the construction of the sets was begun by Zenith and Reinartz was employed as radio operator for the "Bowdoin".

Because continuous daylight will be encountered it was thought that short waves would be best. The "Bowdoin's" sending set is therefore equipped with inductance coils suitable for operation in the 20, 40, 80 and 150 meter bands.

The transmitter consists of a ¼ kilowatt (output) continuous - wave and telephone set operated from a 32-volt storage battery. A duplicate battery is provided, also duplicate 750-watt Delco gas-engine-driven charging generators. The batteries and generators are located in the engine room from which lines are run to duplicate "Esco" 1000-watt 2000-volt motor-generators, also installed in the engine room but controlled from the radio room. The 500-cycle motor-generator used last year by Mix has been left in place so that also may be used.

Because of previous experience with such material under the very severe conditions of moisture, high voltage and high frequency it was decided to build the oscillator frame and panel of wood. Hard dry maple was used. It was waterproofed by boiling in paraffine for several hours at the Thordarson Electric Mfg. Co. It was found possible to engrave scales, etc., directly on the waterproofed maple.

The circuit used was shown on page 33 of the February issue of *QST*.



THE COMPLETE SHORT-WAVE EQUIPMENT.

Oscillator panel at the left, modulator panel in the center, power panel at the right. The oscillator and modulator panels are described in detail elsewhere. Referring to the power panel we have at the top the A.C.-D.C. switch for shifting the plates from the direct-current generator and the 500 cycle generator. Below this are three "off-on" switches for the three generators. Still below this there are three line switches for the three motors. Still below this there are three field switches, one for each generator, also two field rheostats. At the extreme lower part of the frame is the filter system.

Receivers

Several receiving sets have been supplied. Among these is a Zenith short-wave receiver, a "Super Zenith" broadcast receiver and a long-wave receiver for press messages and time signals.

The short-wave receiver is equipped with plug-in coils so that the range of 15-220 meters may be covered. The condensers have been equipped with a special reduction having a ratio of 40 to 1. This set uses a detector and two stages of audio amplification.

Two portable loop receivers (7-tube) are also provided. These operate in the broadcast band of wavelengths and therefore can be used by exploring parties to locate the ship or a plane in distress. It is believed that the 500-meter wavelength will be the most reliable for this work as the directions indicated will be more accurate.

* Engineer, Zenith Radio Corp., and 1QP-1XAM, S. Manchester, Conn., respectively.

The "Peary's" Radio Equipment

The "Peary" will carry two sending sets. One of these is the well-known Navy Standard 2-kilowatt 500-cycle spark set, operating at the customary standardized wave-

THE BACK OF THE OSCILLATOR PANEL.

The various parts will be recognized from the description given on pages 33 and 34 of the February issue. The main thing to be noticed here is that the frame has been made large enough so that there is ample space between parts.

lengths. The other set is a Zenith 2-kilowatt tube set operating at 500 meters for aircraft work and possibly also at other waves for general communication.

The Loening Planes

The planes will carry short-wave low-power transmitters in which a single C-301-A tube is operated as an oscillator with dry battery filament and plate supply. The battery equipment for this work has been especially designed by the Burgess Laboratories and contributed to the expedition without charge. Spare parts are provided in great abundance. These sending sets are provided with modulator tubes for local work. These modulators are connected in automatically when the key plug is replaced by the microphone plug. These small sets operate bewteen 37 and 42 meters wavelength.

The planes will also carry Navy standard aircraft transmitters operating at the standard aircraft wavelength of 500 meters.

When in flight the customary trailing wire antenna will be used. When working from the earth a single-wire antenna will be supported by a sectional mast.

The receiving sets are normal detector-two-audio sets operating at 40 or 500 meters with either trailing antenna or loop.

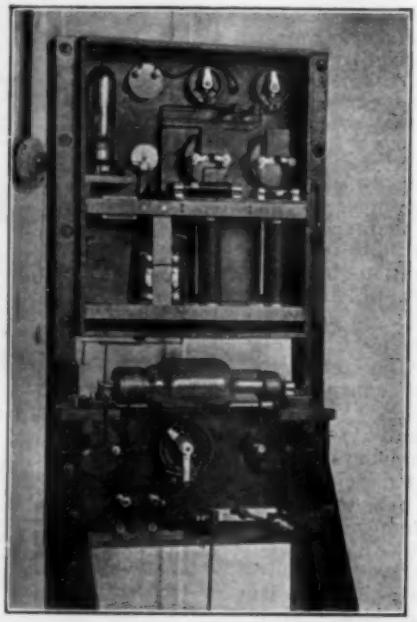
Spare Parts and Emergency Equipment

Nearly 600 spare vacuum tubes of different sorts are being provided, including complete replacements for each flight made by each airplane set.

Parts have been provided for a quickly-removable emergency transmitter, should the ships be caught and damaged by ice. Included in this equipment is a 2000-volt dry battery which will operate the emergency sending set for nearly 20 hours continuously.

Donations

A large part of the equipment has been donated by various manufacturers who



THE BACK OF THE MODULATOR PANEL.

The 50-watt tube at the top of the panel is a speech amplifier, the 250-watt tube is the modulator. The rest of the apparatus is self-explanatory.

wished to aid the expedition. The construction and installation of the equipment, as was mentioned before, was done by the Zenith Radio Corporation.

England and Australia Work in Daylight!

g2OD and a2CM in Constant Communication on 20 Meters

A DAYLIGHT two way communication record of 10,300 miles was recently made when, on May 3rd British 2OD, owned and operated by Mr. E. J. Simmonds, Gerrards Cross, Bucks, England, and Australian 2CM, Mr. Chas. D. Maclurcan of Strathfield, N.S.W., connected on 20 meters at 5:52 A. M. (G. M. T.). Communication was held until 7:15 A. M., when contact was lost due to the fact that Mr. Simmonds had to stop to shave and pack up for business!! We can't imagine ever stopping if we were participating in a communication like that one!

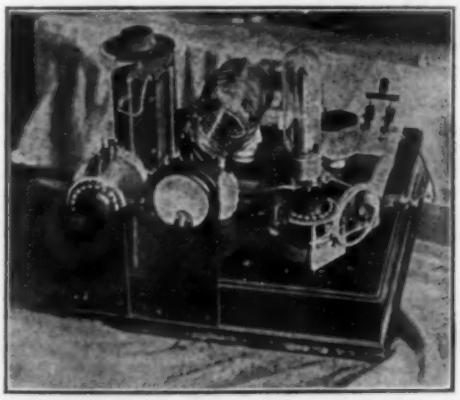
The next morning contact was re-established at 5:20 A. M. and the following messages were handled:

nr 1 to The Prime Minister of England—ON OCCASION OF THIS ACHIEVEMENT AUSTRALIA SENDS GREETINGS—(signed) Prime Minister of Australia.

nr 2 to Dr. W. H. Eccles Radio Society of Great Britain—GREETINGS TO YOUR SOCIETY FROM WIRELESS INSTITUTE NEW SOUTH WALES DIVISION BY FIRST 20 METER DAYLIGHT WORKING — (signed) Maclauren

Nr 3 to Wireless Institute of Australia—GREETINGS TO WIRELESS INSTITUTE BY DIRECT AMATEUR 20 METER WORKING FROM RADIO SOCIETY OF GREAT BRITAIN—(signed) Eccles.

Several months ago we heralded the daylight communication between u1XAM and u6TS as a pioneering achievement of the highest order. It certainly is a pleasure to announce this new world's daylight record so soon after the initial tests on 20 meters in daytime had proven a success. Similar to these tests and subsequent daylight contact across the United States, the work between Australia and New Zealand is not the result of just an accident.



20 METER TRANSMITTER AT a2CM

In the early part of April, Mr. Simmonds, after successful trans-Atlantic work on 20 meters, cabled Mr. Maclurcan requesting him to construct a transmitter to work on 20 meters and make an attempt to communicate with England in daylight. As a result tests started on April 14th.

The transmitter used at a2CM consists of a single UV-203 tube in a coupled Hartley circuit. At g20D the input has never exceeded 125 watts, a Marconi T 250 tube being used.

On the first test date, April 14th, g2CM received a cable stating that three British stations heard his signals on 25 meters in daylight. On April 16th 2CM received a cable from England stating that g6UV heard 2CM very clear and very loud just after 7 A. M. On April 17th England cabled that all of 2CM's tests were received, including an attempt at phone work. Phone would not carry across but carrier wave was heard. On April 20th tests were repeated, and England reports a2CM very QSA and all test signals copied. Later that afternoon a2CM connected with NKF. Contact was perfectly satisfactory, and communication was held for half an hour. NKF was on 20.8 meters and a2CM on 21 meters.

Contact with England was finally established on the morning of May 3rd, and since that date a2CM and g20D have been in daylight communication regularly. FINE BUSINESS OM's.

Central Division Convention

(2nd Annual Hoosier State)
July 10th and 11th, 1925.

THE Indianapolis Radio Club who will have charge of the 2nd Annual Hoosier State Convention have completed all of their arrangements for a WONDERFUL time for the amateurs who are coming. Everybody in the Central Division is invited. The convention is to be held at the Severin Hotel, just half a block from the Union Station.

The committee has made arrangements at this hotel, as well as the Hotel Spencer, across the way, for those desiring cheaper accommodation, to look after all of the visiting amateurs. Write them for reservation.

Here is your opportunity, fellows, to meet each other and renew the old friendships made over the air.

WE EXPECT YOU.

The Hertz Antenna at 20 and 40 Meters

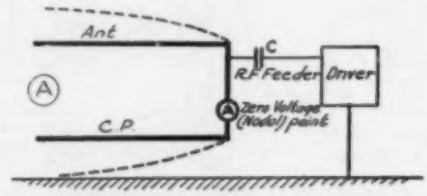
By Howard M. Williams

THERE is nothing new about this type of aerial, it is simply evolved step by step from our old 200-meter aerials. I can best describe it by explaining how it was worked out. My old aerial had a natural period of 120 meters and by using a very small coupling coil, I had no difficulty in working at 40 meters using the third harmonic. For various reasons I was not satisfied with the energy transfer and decided to try the following plan. The antenna and counterpoise were first connected together inside the station through an R.F. ammeter and the system was excited by capacity or static coupling along the lines outlined by 8VN on page 23 of June, 1923 *QST*. See Fig. 1a. 8VN's scheme is to take the exciting tap from the high voltage side of the R.F. circuit, through a small coupling condenser C to one side of the voltage node of the antenna system as in Fig. 1a. At 9BXQ it was found better to leave the condenser C out of the R.F. feeder.[1] If the exciting tap is connected directly to the plate, oscillations will stop, and if to the filament, no energy will be transferred to the aerial, hence a mid point must be found on the plate coil where oscillation will continue with a fair transfer of energy to the aerial. This point is generally about three-fourths of the way from the filament end of the plate coil.

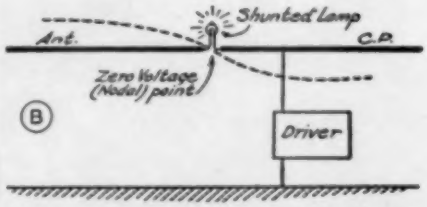
No difficulty was found with this system using the third harmonic, and I received a most flattering report from a third district station about 1500 miles distant. Next evening the aerial was pruned down to a natural wave of 80 meters and operated on the second harmonic. Operation that night was very poor. Of course I had the owner of British 6UZ for a visitor that evening and it may have been that the thing would not work when company was around.[2] However I resolved to cut the system to a natural period of 40 meters and work on the fundamental.

It might be well to mention here that the length of the R.F. feeder from the aerial to the inductance seemed to have absolutely no effect on the system,[3] nor did its resistance, a number 28 wire being used for the feeder.

Now it happens that 9BXQ boasts one 45-foot pole and one 75-footer about 60 feet apart. An antenna with a natural period of 40 meters would not be able to use these to advantage and I set about to find a way to make good use of the big stick. My first thought was to use two wires on a 10 or 15 foot spreader connected together through an ammeter at one end and excited as described above, suspended from the tops of the masts. This would be the same as the scheme of Fig. 26 with the antenna-counterpoise system laid on its side and put at the top of the masts. But—why use two wires? Why not use *one* wire with a period of 40 meters, one end to act as aerial and one end to act as a counterpoise. In other words why not use the good old Hertz oscillator and lift *that* to the mastheads? This is what is now in use at 9BXQ. A wire 20 meters long, was suspended about five feet above the ground on glass towel



The 8XK-8VN (Conrad) system of feeding the antenna-counterpoise system. The condenser C is NOT a necessary part of the system.



Hertzian oscillator placed horizontally at top of poles and fed by R.F line, thereby getting the entire system clear of the earth. The dotted lines indicate voltage distribution

FIG. 1

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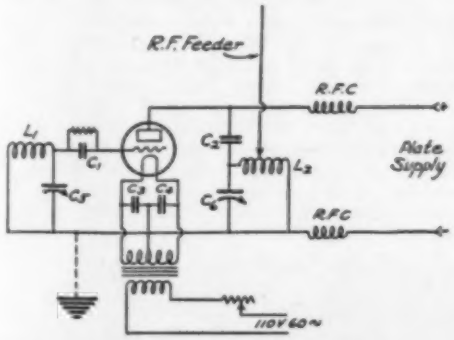
* 9BXQ, 3207 Lake Place, Denver, Colorado.

1. The condenser C is necessary only where the R.F. feeder would otherwise tune to the working wave or one of its harmonics. This is also true for other systems such as that shown in this article.—Tech. Ed.

2. Generally speaking stations are not getting good results when operating on half-wave or second harmonic of the antenna. Some have also run into the difficulty that such operation gives some radiation at the fundamental. Has anyone an explanation for these things? Do all have the same experience? The odd harmonics (1st, 3rd and 5th) seem to work well at all stations.—Tech. Ed.

3. Until it happens to tune to the working wave or a harmonic. Then there's plenty of effect and the feeder must be detuned by use of the condenser C (Fig. 1a) or by a loading coil. However, this does not disturb the statement that the feeder can be of fairly high resistance. The reason for this is that the feeder operates at a good power factor and therefore carries a small current.—Tech. Ed.

rack insulators. It was cut in the center and a small flashlight bulb inserted to show flow of current. A shunt of about 4 inches of number 14 copper wire is necessary here (one fifty-watter used) to keep the bulb from being burned out. The R.F. feeder was connected to the antenna about halfway between the bulb and one end of the antenna. As soon as resonance was obtained the bulb lit up brightly, the only difficulty being that the wave was slightly above 40 meters. This was due to the fact that there was added capacity from each end through the ground only 5 feet away. The feeder was lengthened and the



ARMSTRONG TUNED-PLATE CIRCUIT USED IN THE PRIMARY (DRIVER)

FIG. 2

NOTES: 1-*The Hartley circuit will serve just as well.*
2-*The ground at the filament is very desirable*

C_1 and C_2 - *The usual grid and plate stopping condensers*
C_3 and C_4 - *The usual filament by-pass condensers*
C_5 - *Grid tuning condenser*
C_6 - *Plate tuning condenser*
L_1 and L_2 - *Grid and plate coils*
The size of L_1, L_2, C_5 and C_6 must be chosen for the wavelength.
R.F.C. *The usual R.F. chokes as often described before.*

"aerial and counterpoise" suspended from the top of the masts as in Fig. 2b. The wave was then almost exactly 40 meters.

This has been in use for so short a time that as yet no definite tests have been made to determine exactly how this system compares with the usual one. I only know that I am always QSO both coasts and that stations many times take the trouble to tell me to send each word only once, and never ask for repeats, which means more to me than a "vy QSA hr om".[4] Changing the driver to 20 meters and adjusting the feeder tap without touching the aerial, shifts the system to 20 meters. Things work beautifully, a six reporting me the loudest station he had ever heard on 20 meters.

Better warn the neighbors about the bulb in your aerial or they are likely to think something is on fire. Of course a bulb is far from being a precise way to measure current, but when the measuring device must be 60 feet above ground, I believe a light is about the only thing to use. Perhaps someone can suggest a better way, I certainly hope so for your neck gets stiff from looking at your aerial so much.

There is certainly lots of room for experiment along this line. For instance: would two parallel wires as suggested before be better? (I think not). Is this kind of aerial any more directive than the usual type? Would it be better perpendicular or horizontal?[5] Is one wave length the best for the length of the wire or would ½ wave be better (or twice the wave)? Would there be any advantage in inserting a little resistance to give more flexibility in tuning? Where is exactly the best point for connecting the feeder on to the aerial? etc. etc.

In any event I think that the losses of this type are the lowest of any of our short wave aerials. The only ones are through the insulators at the ends, actual resistance heat losses, and losses in the feeder wire. The lead-in losses are very low, and losses from surrounding trees, buildings, etc., are reduced to a minimum because the *entire radiating system* can be raised above them, and there are practically no ground currents.

This is a good deal the same aerial as we have been using in our 5-meter experiments except that it is on a larger scale. I will be glad to hear from anyone trying it and would like to arrange for some tests, daylite preferred. That leaves only one point. We have found the old Armstrong tuned-plate circuit of Fig. 2 to be very good for the driver circuit of antenna systems, which are supplied through an R.F. feeder.

4. Amen! How often have all of us been fooled by the liars who say "Vy QSA" and one minute later can't copy a message.—Tech. Ed.

5. Probably depends on wavelength and distance.—Tech. Ed.

Correction

THE "Computation Charts" appearing in our last issue on pages 42 and 43 were the work of Mr. C. T. Burke of the General Radio Co. We had assumed Mr. MacArthur to be their author because they were received through his cooperation.

These charts are tremendously handy things; we only wish that they had been run under the title "Dodging Arithmetic." We didn't think of that title soon enough and are glad of this opportunity to say a good word for the charts, even though we must apologize at the same time.

Glass Panels

By S. A. Twitchell*

Do you believe in miracles? We do after finding that Mr. Twitchell not only drills through glass panels with a twist drill, but actually makes a business of it, and has filled the twin cities with glass panels for everything from superheterodynes to portable sets.

I HAVE just had to snap out of a dream on account of a keg of dynamite which I strongly suspect was placed directly beneath me by one 9XAX on account of the fact that I have neglected to send *QST* a few simple instructions for perforating sheets of glass to be used for panels. Therefore, I will try to explain in detail how this little job is done.

Plate glass for radio panels can be selected from pieces of windshield or showcase glass and should not be less than ¼" thick as the thinner glass cracks too easily. For cutting, an ordinary ten cent Red Devil cutter will do. The glass should be cut to the exact size that is required when finished. The edges are then ground on the side or flat face of a grindstone wheel, which should preferably be mounted on a vertical shaft. The glass panel should be given a rocking motion as shown in Figure 1, to avoid chipping the glass on the edges. After this grinding process is complete you will have your edges all ground so they are approximately round.

Then comes the polishing operation. This is best done by mounting a hard wood wheel on an arbor as an emery wheel would be mounted. This wheel must run perfectly true, but not too high in speed. The edge of the panel is given a coating of valve grinding compound and is then applied to this rotating wood wheel. At the same time add enough fresh compound to keep a constant grinding or polishing action. After the edges have been polished as much as possible with this valve grinding compound the wheel must be cleaned and powdered pumice stone substituted for the grinding compound. Do not attempt to grind flat edges nor to polish them flat. Also, keep plenty of water on the grindstone, plenty of lubricant on the polishing wheel and never run either of them enough to increase the temperature of the glass. To do so, will mean a cracked panel.

READY TO BEGIN

Panel layout with the cut panel laid over it.

The tools, from right to left, are rat-tail file for reaming large holes, bit shank twist drill for use in the brace when drilling large holes, three cornered file ground for use as a drill or reamer, small twist drill for use in hand drill, Starrett automatic center punch for marking the panel, wax pencil for marking the panel.

Back of the main panel is a small finished panel, also a hand drill holding a small twist drill which happens to line up with the rat-tail file and looks as if it were a part of the file.

Drilling

The tools needed for drilling are:

A paper template with all holes accurately laid out.

A solid bench 18" to 20" high with a rounded bolt head sticking up slightly above the surface.

A machinist's center-punch and hammer (or an automatic center punch).

An assortment of twist drills and a brace.

Several 3-cornered and rat-tail files to be used in the brace as reamers.

A small cup of turpentine or an oilcan filled with turpentine.

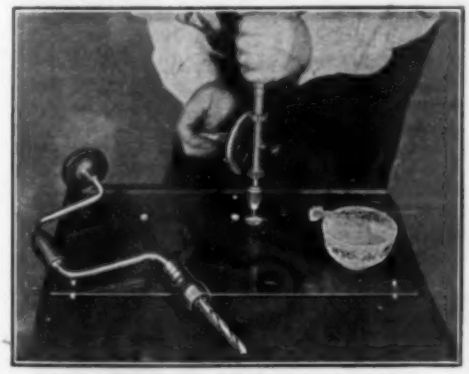
* S. A. Twitchell Co., 1925 Western Ave., Minneapolis, Minnesota.

A small brush.
A pair of goggles.

To drill the holes lay the paper template on the bench with your panel directly over it so the holes are right where you will want them in the glass. Take your hammer and center punch and with very light but sharp blows mark every hole *directly on the glass*

PANEL SHOULD BE GIVEN ROCKING MOTION
FIG. 1

itself. For our own use we have a Starrett automatic center punch which we find much quicker and which strikes a uniform blow. After marking holes on one side of the glass, turn it over and mark them again on the other side. Now, place your panel so that the bolt head which projects up from the top of the bench is directly below one of these punch marks. Take a small drill which is sharpened the same as a machinist would have it, mount it in the drill brace, dip it in the turpentine and proceed to drill

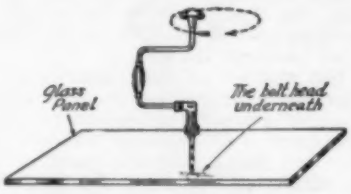


DRILLING THE PANEL

Notice that a coin has been laid under the panel at the point where it is being drilled. The coin acts as a makeshift substitute for the carriage-bolt head which is ordinarily used. The turpentine bowl and swab are at hand, however.

into the glass. A word of caution here may save a half finished panel; be careful that you do not drill through too far as otherwise you may split out the other side. Always be sure your drill is directly above that faithful bolt head so that the pressure is all concentrated squarely below your drill.

You will find that when your drill is fairly sharp that glass is a very soft material and you will be surprised at how quickly you will be more than half way through that panel. These holes should each be drilled in this same manner, none of them going more than half way through the panel, each one in turn being drilled with the bolt head directly below the point of the drill so as to keep the pressure concentrated at that point. After all holes have been drilled half way through, turn the panel over and drill from the other side so the holes all meet in the middle, being careful not to use any great pressure after the holes have started to come together. Sometimes revolving the drill backwards will break out particles of glass which cannot be removed any other way. One important point to bear in mind while doing this drilling is to turn the drill *slowly* and *keep the head of*



"KEEP THE HEAD OF THE BRACE MOVING...."
FIG. 2

the drill brace moving in various directions so the axis of the drill is always changing, see Fig. 2.

Reaming

For enlarging the holes a 3-cornered or rat-tail file proves very handy. They must however be rotated in the opposite direction of that in which you would turn a drill or otherwise they will screw right into the glass and split it. Some people prefer to do their drilling with a 3-cornered file. For this purpose the file should be ground on all 3 sides for about 1" back from the point so it is perfectly smooth, then the point should be ground at an oblique angle so that it will leave one cutting edge and it should be so arranged that this edge will cut when the file is turned backwards for the reason given above.

Countersinking is best done with the point of a very large drill, being very careful and turning slowly.

We mention in our list of equipment a cup and brush or an oil can. We prefer a cup and brush because we can dip our drill in the turpentine or we can brush the turpentine on to the drill or on to the work. We also list a pair of goggles. These should be worn by the operator *at all times* when operating with glass to protect the eyes from flying splinters, because in all this drilling the glass will not be cut at

any time. The particles of glass to be removed will simply be splintered out and altho most of it will be caught by the turpentine, yet there will be a goodly amount of glass splinters for several feet around where the work is done.

To give an idea of the speed at which this work can be done by experienced hands, the writer cut and polished a 9" by 18" panel and drilled to their proper sizes 63 holes in 2 hours and 35 minutes.

Midwest Division—Iowa State Convention

THE Convention opened at Iowa State College, Ames, Iowa, at 8 o'clock Friday morning, April 17th. By nine o'clock a very lively time was under way, and the new arrivals were greeted with a medley of calls midst a characteristic amount of amateur QRM.

9LC, the station of the Campus Radio Club, was open for inspection, and proved very popular among the out-state hams. 8ZD's fog horn of '23 vintage was ably replaced by two hams with the mouth-pieces off their saxe's, and by noon the QRM was terrible.

Norton, of 9LC, opened the afternoon meeting by introducing our own Professor Jansky. His subject of course was SHORT WAVES. His lecture was most interesting, and was ably accompanied by his rope, even unto the third and fourth harmonic thereof. In fact the Professor was so clever at setting up oscillations in his rope (for purposes of illustration) that the Co-eds about the campus peeked in the windows to secure his secrets for their rope-jumping exhibition.

Mr. Norton then introduced our able Dakota Division Manager, of 9ZT, who told us, "Professor Jansky has explained how to do the thing theoretically; now here is how it is generally done." Don then set forth numerous ways of practically attaining the results described by Jansky, and showed us several methods of making our own present antenna system work on the low waves. Wallace also discussed a 10-meter band and showed what a help it would be as a stepping stone from the 20 to the 5-meter band.

The extreme silence about the room when these men were on the floor was a marked tribute to the interest with which they held their audience. And when you have held over half a hundred hams quiet and attentive over a two hour period, you can go out and tell the world you have done something!

The banquet was held Friday evening at the Cranford Banquet Hall over in "campus town". It was a glorious success under the able direction of Mr. Norton as toast master. Short but interesting talks were given by nearly everyone present, and the crowd adjourned to the campus to see "HOW IT ALL BEGAN",—a play in three acts. This play was ably put on by members of the Capital City Radio Club, of Des Moines, and was instructive in A.R.R.L. history, as well as entertaining. The gang was introduced to the mysterious character, THE OLD MAN, and also to his CAT. The C.C.R.C. is a very live organization, and did the thing up brown, art.

Saturday morning the program opened again at Engineering Hall with Professor Brown, of University of Illinois, on deck to explain his work on carrier-wave-less transmission. He gave a very interesting lecture on this subject with a series of slides to illustrate his points.

At 10.40 Wallace again took the floor and explained in detail the present 20 and 5-meter transmitters at 9ZT. He showed diagrams of several receivers that worked well on low waves, and gave us some wholesome advice on getting the old pile down where the output is measured in watts and not in "thermo-couple-amps".

Immediately after lunch, our Midwest Division Manager gave a general review of traffic conditions throughout the Division, touching upon the history and achievements of amateurs and the League, showing how they were being recognized for their work by the "powers that be". Traffic methods were discussed, with a detailed explanation of standard A.R.R.L. practice in CQ-ing, handling messages, taking part in tests and relays and O.R.S. procedure. Several interesting points were brought out on club work, and in handling B.C.L. interference problems.

The meeting was then taken over by A.D.M. Watts, who conducted the traffic meeting with a general discussion of traffic problems and made us resolve to follow A.R.R.L. operating practice more closely, and whip our stations into shape for new O.R.S. certificates.

With a promise to see each other on 20 meters the next night, the gang went home with a feeling of having had a ripping good time as well as one very well spent, and a resolve to get out the ohm saw and make their 80-meter records look sick.

—*P. H. Quinby, 9DXY.*

How Are Short Waves Reflected?

By H. A. Joyce*

INASMUCH as no other theory has been able to account for the differences between day and night transmission, the theory based on the phenomena of reflection or refraction of radio waves from the upper atmosphere must be admitted.

The author does not feel that it is conceivable to consider that the short waves penetrate further into the reflecting layer

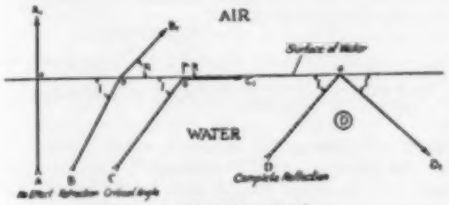


FIG 1 LIGHT IN WATER AND AIR

than the long waves as necessitated by the theory of J. L. Reinartz presented in his article in April *QST*. The alternative theory of the Technical Editor as a footnote to the article in question is somewhat nearer his view. The author desires to suggest a new theory which he believes has never been published before.

Pierce has shown that all electromagnetic waves follow the same laws, i. e. *radio waves and light waves obey the same laws of reflection and refraction.*

To understand what will happen to radio waves entering the upper atmosphere we may turn to the effects found when light passes through similar conditions.

In Fig. 1a we have a ray of light leaving water vertically and entering air. It does this without being bent. If the light starts at a slight angle such as that of Fig. 1b the light will be refracted or bent as it leaves. Also, as the angle I is made smaller the angle R will become smaller at a *more rapid rate* until we have the condition of Fig. 1C where the light does not leave the water at all but grazes the surface along the line OC'. The angle at which this takes place (the angle I in Fig. 1C) is known as the "critical angle". If the light comes up through the water at a still flatter angle as shown in Fig. 1d it will not come out of the water, neither will it graze the surface. We now get another effect, that of complete reflection in which the angles I and R are alike.

If light and radio waves are of the same nature they will act in the same manner as has been said before. Thus from the laws of physics we are able to construct a perfectly conceivable theory of reflection from the upper atmosphere.

Upon proceeding upward the radio wave passing continuously from denser to rarer media is bent by refraction. When the limit of the atmosphere is reached the angle of incidence is greater than the critical angle, for the two media and the wave is reflected back to earth.

Independently Stuart Ballantine and Dr. van der Pol have both investigated the theory of radiation from an antenna excited at waves below the fundamental, and their investigations have unearthed the following fact: That when an antenna excited

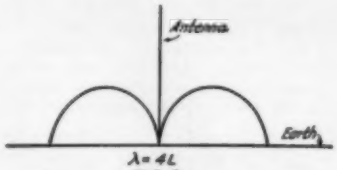


FIG. 2

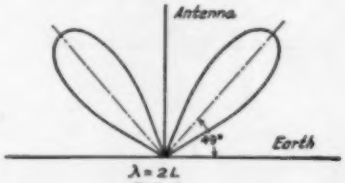


FIG. 3

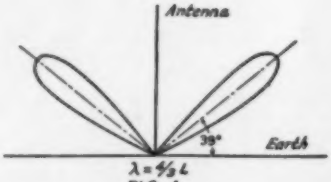


FIG 4

at a wave below the fundamental the energy is radiated at an altitudinal angle. Figs. 2, 3, 4, 5 and 6 show how the angle of transmission varies as the ratio of operating wavelength to the length of the antenna. Thus it is seen that several facts brought out by Reinartz can be accounted for. The necessary increase in wavelength at sunset in order to keep in communication was not effective as an increase in wave-

* 3986 14th St., Detroit, Michigan, Univ. of Detroit, Asso. I.R.E., Member, Experimenters' Section, A.R.R.L.

length but as an increase in the angle at which the energy was radiated. Thus if the wave were kept constant and the size of the antenna diminished the effect would have been the same. A complete study of the graphs will reveal some astounding facts.

No simple mathematical formula can be given so as to find the correct height of the reflecting layer due to the fact the wave is refracted upon proceeding upward by gases of an unknown density. However its effective height could be calculated by simple trigonometry as shown in Fig. 7. Thus from the distance to the receiving station and the angle at which the radiation intensity is the greatest the effective height of the reflecting surface could be calculated for that time and temperature.

This brings up the subject of beam transmission. At present all beam transmission is done parallel to the earth's surface. To date this has not proved immensely satisfactory. The absorbtion of the short waves by objects on the earth's surface is so great that it would be far better to elevate the reflector to the correctly calculated angle

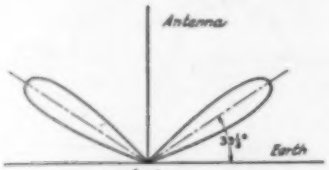


FIG. 5

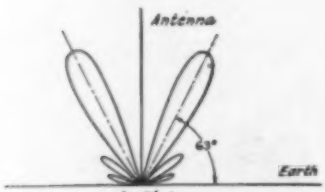


FIG. 6

NOTE: *In figs. 2, 3, 4, 5 and 6, L is the height of the vertical antenna in meters. It is assumed that the earth is perfectly conducting. The transmission shapes will be modified if the antenna has another shape or if the earth is not perfectly conducting.*

and transmit the waves by reflection from the upper atmosphere. This at present appears to be the only method by which waves below 5 meters can be successfully transmitted.

A complete review of the subject brings one to the conclusion that there is no difference between short and long waves. The apparent difference is due to the fact that experiments have been conducted on large antennas operated below the fundamental; the change of impressed wave of course changing the angle at which the energy is radiated. That the effects were not noticed nearby is explained by the theory in the first part of the article. For reflection at

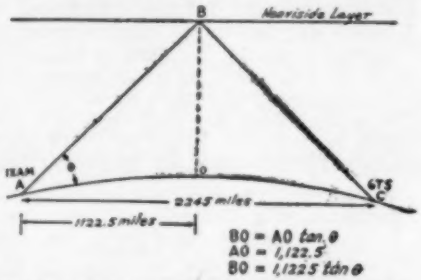


FIG. 7 CALCULATING THE EFFECTIVE HEIGHT OF THE HEAVISIDE LAYER.

short distances the energy would have to be radiated almost vertically, but in this case the energy would not be reflected but would pierce the layer and be lost.

The absorbtion factor is much higher with short waves, due to the fact that there are many more objects on the earth's surface with a lower fundamental wavelength than those with high fundamentals. In this lies the fact that reflection is more noticeable at short waves, the waves parallel to the earth's surface being all absorbed by the time a distant station is reached, leaving only those reflected from the upper atmosphere.

Who Was First Across at 20 Meters?

QUITE a controversy has arisen as to the priority on the first 20 meter two-way communication across the Atlantic. At this particular time t ə Technical Editor is all mixed up on the thing and does not really know who deserves the credit.

Will all those who think that they were the first ones please let us have complete details, addressing them to the Technical Department of *QST*? If you were not in on the thing but have some evidence on it, please give us that.

Please notice that such information is absolutely worthless unless the dates are given and unless you mention what kind of time you are talking about.

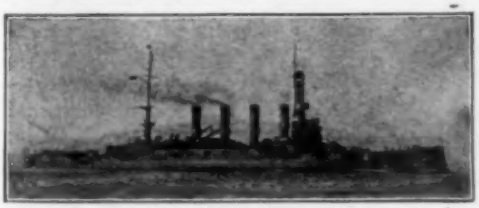
It is understood, of course, that when we say 20 meters, we mean anything inside of the 20 meter amateur band. We are talking primarily about who was first across on 20 meters at any time of day but also are interested in establishing who was the first on 20 in daylight. To the best of our belief the parties were Reinartz, u1XAM, and Secretan, g5LF.

NRRL In Action

By A. Hoyt Taylor*

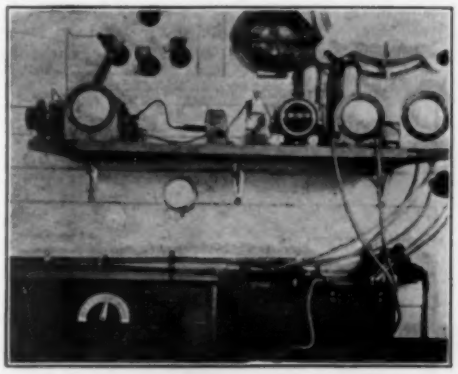
THE tests with NRRL, after a rather inauspicious start, have been going better and better as time goes on, in spite of the increasing summer static. The *U.S.S. Seattle* left San Francisco before her high-frequency installation had been completed. Although a few tests were run with various members of the League, on the trip to Honolulu, no thoroughly satisfactory results were obtained until the *Seattle* reached Hawaii. There have been several periods during which radio silence had to be observed, which cut holes in the schedules, and although no serious difficulty had been observed in the transmitters themselves, except an occasional sparking-over of the condensers, the motor-generators, both for the Naval set and for the set furnished by Lieut. Schnell, have given a great deal of trouble.

About the 5th of May, however, the 54-meter set was for the first time put up to full power and from that time on has been heard fairly regularly both at the Naval Research Laboratory, and by many amateur stations. The first tests on 54 meters run prior to May 5th, were on comparatively low power and were not very successful. In fact, it is believed that there are a number of East Coast amateurs who have done much better receiving work on NRRL than we have been able to do here at the Laboratory. This is largely due to the fact that our 71.35-meter traffic working on high power, very close to our receivers, has had to be excluded, and it has been a difficult thing to do this without sacrificing considerable signal strength. In other words, our receiving sets are hampered by the continuous activity of our own transmitters. We are nevertheless pretty well satisfied with the results obtained. It is interesting to note that when the 54-meter set first began to come through, it was the most satisfactory for actually handling traffic. The signals were excellent and the use of quartz-crystal frequency-control rendered it easy to copy, but now, as far as reception in Washington, at least, is concerned, the 40-meter set, which is not crystal-controlled, is generally better for handling two-way communication between NKF and NRRL. The reason for this is that the increasing amount of static or strays has been more damaging to the 54-meter signal than to the 40-meter signal. In other words, the 54-meter signals are still excellent, but the static on that wavelength is getting to be quite bad. It appears also that, owing to the condition of the motor-generator supplying the 54-meter set, the use of that set is kept down to minimum. It must also be remembered that on board a ship, where a good many motors and genera-



THE U.S.S. SEATTLE

NRRL is located in the compass-room on the top deck just aft of the last of the four funnels. Two single wires, each 42 feet long, run from here to the right and left yardarms of the rear mast. One antenna is for transmitting and the other for receiving.



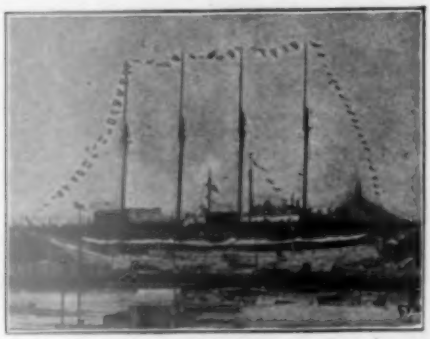
INSIDE THE COMPASS-ROOM — NRRL

Schnell says the temperature in here hangs around 130 degrees! Anybody want to trade jobs?

WILLIAM GRAHAM, "WG" OF NRRL

* Physicist, U.S.N., Supt. Radio, Naval Research Lab., Bellevue, D.C.

tors are in operation, and transmitters on various frequencies, receiving conditions are difficult. This is particularly true of the 20-meter band. There appears to be many disturbances difficult to copy through. It also appears that the 20-meter radiation from NRRL is notably ineffective. It has been heard only a few times at NKF and then only very weakly, and only a few amateurs (mostly west of the Mississippi River) has recorded anything from NRRL on the 20-meter band. Further



KFUH

The South-Seas expedition that is putting such wicked 39-meter signals into all parts of the U.S. During the "Seattle's" stay at Honolulu this set (2 250-watters) was operating only 200 yards from NRRL.

experiments are under way along this line to see what can be done to improve this condition.

In the 40-meter band the *Seattle* has apparently worked every district in the United States and has had excellent results with our Naval stations on the west coast and in Samoa. Much communication has also been maintained with New Zealand and Australia. NRRL has also been heard in Paris by G. Gilé, who reports logging the 54-meter signals at 5:10 P.M., G.M.T., on May 3rd. The only regular schedules now in effect are the 20-meter schedules at 2.30, 4.30 and 6.30 P. M. E.S.T. In addition to these, certain regular traffic with NKF, NPG and NPU will be observed, using the 54 and 40 meter waves.

The most interesting part of the tests is coming; namely, after the *Seattle* starts on down through the South Seas.[1]

Some interesting data have been collected in an incidental way in connection with these tests. NKF has established two-way communication in the 20-meter band with Sydney, Australia, and also with a station in New Zealand. Two-way communication was also established in the middle of the day with British 5LF, and on a number of occasions in the 40-meter band direct communication has been established between NKF and NPU, at Tutuila, Samoa. NRRL appears to have absolutely sure communication from Honolulu with NPU on the one hand and NPG on the other. Between 3 and 6 A.M., E.S.T., there is about a seventy-five percent chance of two-way communication with NKF.

1—This is very true, and all of us should bear it in mind. Hawaii is just the starting point; the most important part of the trip is still ahead.—Asst. T.M.

NRRL Log, April 23 to May 14
(Ship at Hawaii the entire time.)

WORKED

U.S.—1CMP, 1OW, 1PM, 1PY, 1XAV, 1YB, 2AAY, 2BGI, 2BRB, 2CV, 2CXW, 2QH, 3APV, 3OU, 4DM, 4RM, 5AAH, 5ACL, 5AEC, 5OX, 6AFG, 6AHP, 6AJI, 6AJJ, 6ANB, 6AND, 6ASR, 6AWT, 6BGO, 6BUR, 6CAQ, 6CC, 6CGO, 6CGW,, 6CHL, 6CLP, 6CMQ, 6CSS, 6CST, 6CTO, 6GB, 6JI, 6LJ, 6OI, 6VC, 6VW, 6XAP, 6ZAC, 6ZO, 7AU, 7DC, 7GG, 7KU, 7LL, 7YB, 8ALY, 8APW, 8CHK, 8GZ, 8JJ, 8KS, 8NX, 9ADO, 9AGL, 9BBY, 9CCS, 9CLD, 9CUL, 9DAT, 9DED, 9DEZ, 9SR, 9ZT.
Australian—2BK, 2CM, 2DS, 2IJ, 2MU, 2YL
Canadian—5BA.
Japan—1AA.
Mexican—1B.
Navy—NAJ, NKF, NPG, NPM, NPU.
New Zealand—2AC, 2XA.

HEARD

U.S.—1AF, 1AFF, 1BDX, 1CBB, 1CMP, 1CMX, 1KC, 1OW, 1PL, 1PM, 1PY, 1TE, 1VD, 1XAM(20m), 1XAV, 1XU, 1YB, 2AAY, 2ALY, 2BEE, 2CXW, 2RK, 2RM, 2WA, 2WB, 2WC, 2ZV, 3BQ, 3LZ, 4JR, 4OA, 4SA, 5ADO, 5AN, 5CE, 5EF, 5FH, 5NJ, 5OX, 5PH, 5UK, 5WY, 6AFG, 6AGE, 6AHP, 6AJI, 6ALE, 6ALG, 6ALW, 6AN, 6AND, 6AOI, 6AWT(40 and 20), 6BIL, 6BJD, 6BMW, 6BUR, 6BVE, 6CAI, 6CAQ, 6CC, 6CCY, 6CEJ, 6CGO, 6CGW, 6CHL, 6CIX, 6CLR, 6CLZ, 6CM, 6CR, 6CSW, 6CTN, 6CTO, 6CW, 6FZ, 6HM, 6HU, 6IM, 6JI, 6LI, 6NO, 6OA, 6OI, 6QI, 6UA, 6UT, 6UW, 6VC, 6VW, 6XH, 6XI, 6ZAC, 6ZBN, 7ADM, 7AIJ, 7AY, 7DC, 7GB, 7NO, 7NX, 7UV, 7YA, 7YB, 8AA, 8AFN, 8AGN, 8ALY, 8APW, 8CS, 8CYI, 8DO, 8DS, 8DSD, 8GZ, 8JJ, 8KS, 8ZE, 9APM, 9ARC, 9AYP, 9BCT, 9BDU, 9BHT, 9BKR, 9CAA, 9CCP, 9CGN, 9CSG, 9CTX, 9CUL, 9CUO, 9CXX, 9DBZ, 9DED, 9DEU, 9EAK, 9EJY, 9ELI, 9GV, 9RK, 9RY, 9SR, 9XI, 9XN.
Australian—2CM, 2DS, 2MU.
British—2SZ.
Canadian—5BA.
Japan—1AA.
Mexican—1B.
New Zealand—2AC, 2XA.

Future QRA NRRL

Leave:—		
	Honolulu	July 1
	Pago Pago	July 11
	Melbourne	Aug. 6
	Wellington	Aug. 24
	Pago Pago	Sept. 3
	Papeete, Tahiti	Sept. 14
	San Diego	Oct. 2
Arrive:—		
	Pago Pago (Samoa)	July 10
	Melbourne	July 23
	Wellington	Aug. 11
	Pago Pago	Aug. 30
	Papeete, Tahiti	Sept. 8
	San Diego, Calif.	Sept. 29
	San Pedro (Los Angeles)	Oct. 3

Loops and Fords

By Oliver Wright*

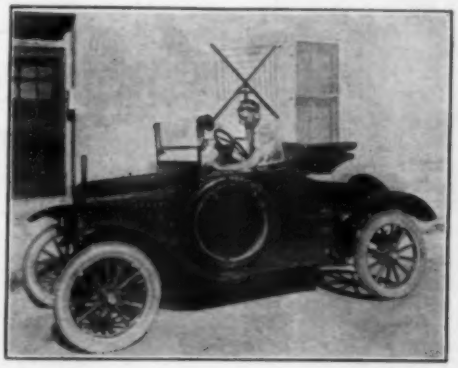
I RECENTLY became the owner of a roadster formerly owned by a Detroit millionaire. It was immediately fixed up as a true radio flivver. The rear tire cover was gayly decorated with my two calls, my initials, 73 and so on. A key was mounted on the steering wheel brace and connected to the horn. Being of the magneto driven type this horn gives an excellent imitation of an ancient rotary gap. Finally a defunct 50-watter was mounted on the radiator cap. This 50-watter glistens gayly in the sunlight and causes more near-accidents than a pair of rolled top socks.

Of course the next step was to mount an 80-meter transmitter in the car and when I accidentally got a little ways ahead of my studies this job was begun.

All the work hereinafter described was carried out in cahoots with the University of Arizona radio station 6YB. I am an inmate of the institution in question.

Having had some previous experience with loop transmission it was only logical to plan such a set for the car. At first it was thought impossible to get enough turns on a reasonable sized loop to work at 80 meters but as soon as experiments were commenced this fear was dispelled. The loop finally decided upon was of the flat spiral type, 30 inches on a side with 6 turns spaced 1¼ inches apart. This type of loop may not be the most efficient but in this case had to be used because of space requirements and wind resistance. After due consultation with the physics and electrical professors it was found that the loop would be the most effective radiator when it was placed with one side parallel to the earth's surface instead of being fixed with one point up.

The loop was lashed to the starboard side of the craft a little aft of amidships and facing fore and aft; which is an attempt at the nautical way of saying that it was fastened on the right-hand side of the car, a little to the rear of the seat and pointing straight ahead.



"————a roadster formerly owned by a Detroit millionaire————"

The set was placed in the right-hand corner of the seat, supported on blocks of sponge rubber and lashed firmly to the cushion. The leads were short and direct, none over 22 inches and a spacer was placed half-way to prevent them from swinging. The set itself took up such a small space that there was plenty of room left over for two operators without crowding.

Figure 1 shows the circuit. The first thing that will be noticed is that the same set is used for transmitting and receiving. The primary reason for this is portability but it makes a satisfactory combination and is effective for both purposes as will be explained later.

The panel is 9 inches by 14 inches and the set is so constructed that a cover can be slipped over it. This cover is provided with a handle for carrying the set. The outside dimensions of the set are 9½ by 11 by 15 inches and the whole outfit can be thrown into the back of the car without special care.

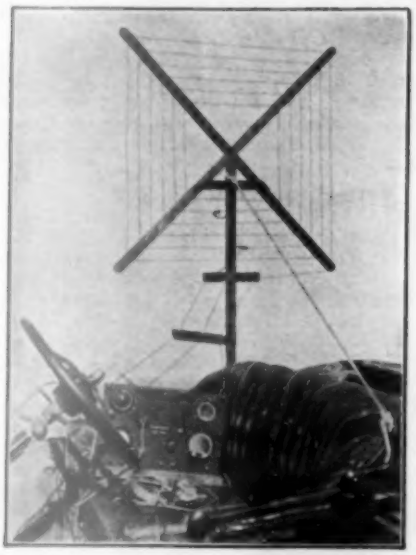
As a receiver, the set works on the super-regenerative basis. In fact, if it simply oscillates quietly no signals will be heard for it will be oscillating too powerfully for the reception of the very strongest signals. When it is operated so as to give the audio frequency whistle, which denotes super-regeneration, the signals will pound in. The whistle and the sensitivity of the whole set can be adjusted by changing the filament current or by placing a variable receiving grid leak in series with the 5000 ohm leak, provisions being made to short circuit this variable leak during transmission.

The radio frequency choke coil is a very important item for both transmission and reception. A coil of No. 22 or No. 24 wire having 200 or 250 turns will be sufficient. It may be necessary to reverse the A battery lead. The transmitter works either way but the receiver works only one way. The tube used in the set was a Western Electric VT2. Other tubes, no doubt, will require different adjustments.

* 6GD, 6BKA, 1099 5th Street, Tucson, Arizona.

Testing

If anyone thinks that this set is good for local work only he has another think coming. When the set was installed in the back of a radio store in Tucson, Arizona, and used for reception without any out-



PORTABLE STATION 6BKA completely installed and ready for use.

side antenna, nearly all Districts but the First, Fourth and Eighth were heard in less than an hour. Think it over, how is that for one tube and a loop? That's where the super-regeneration comes in.

When the set was transmitting at the same location B.C.L. sets *within fifteen feet* of it were not bothered at all.

Transmission

A small hot-wire ammeter and milliammeter as shown in Figure 1, are very useful. Of course the hot-wire ammeter is not an indicator of the output but it *does* show resonance and it *does* show whether the set is oscillating or not.

When a wave meter is used care must be taken. It is easy to burn out a light in the most unexpected position. The easiest way to tell and yet be safe is to start with the wave meter four feet from the loop in the broadside position, with the plate of the loop parallel to that of the wave meter coil. Turn the wave meter past the suspected (and also the unsuspected) waves and watch the loop ammeter and also the milliammeter. When they jump you have hit a resonant point, even if the wave meter lamp does not light. A little tighter coupling will now make the wave meter lamp operate. However the adjustment is exceedingly sharp and it is easy to run by the proper settings. When the wave meter is in resonance it will cut down the loop current materially.

For 80 meter work the two outside turns of the loop were used in the grid circuit and the four remaining turns in the plate circuit, thereby operating with the familiar Hartley connection. The num-

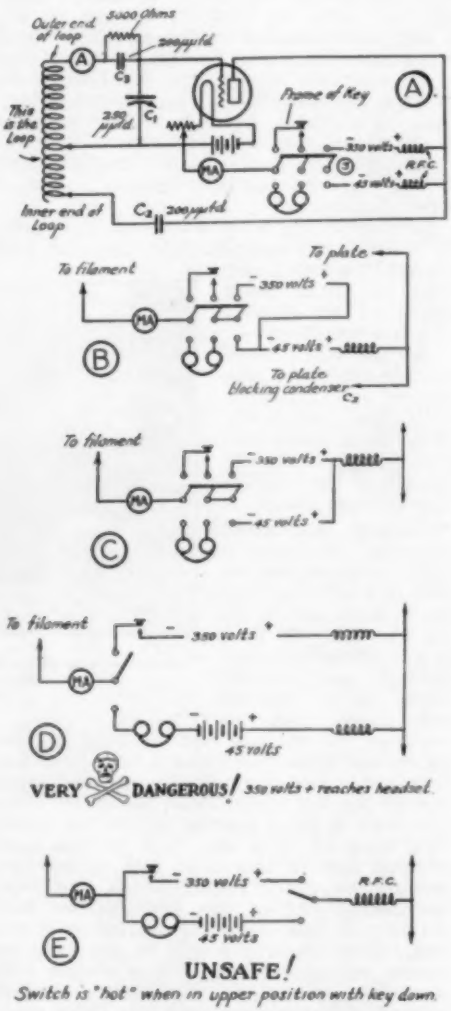


FIG. 1. THE SEND-RECEIVER CIRCUIT

A—Improved wiring suggested by the author to save the receiving B battery from the drain of transmission.
B—The original wiring.
C—Same as A but with one choke omitted. The circuit is unreliable while receiving probably because of the capacity-effect of the large 350 volt battery.
D and E—Circuits with simplified switching to show how such systems are unsafe.

ber of turns used should be variable by means of clip until the correct combination is found. And 11-plate receiving condenser across the grid-coil gave a wavelength of 80 meters when set at half scale.[1] With a plate voltage of 360 (from dry "B" battery) and a plate current of 40 miliamperes, the antenna current was .8 amperes.

There, that ought to be enough data to start with. No doubt you fellows can make lots of improvement but what ever you do let's hear about it. Write it up for *QST*.

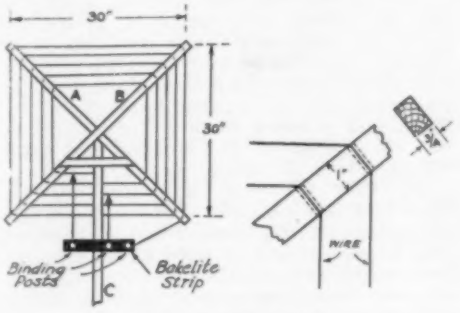


FIG. 2. THE LOOP

Just to start off I will suggest a few improvements myself. The loop can be mounted on top of the set just as in many broadcast receivers. The usual broadcast receiver way of bringing the leads in and out of the set cannot be used of course because the connections must be reliable and the leads rigid.[2] If the thing is done properly there is nothing in the way of 40 meter loop transmission with a loop of three turns or so.

The gentleman in the last row has a question? He wants to know if the set has any kick. I think we can answer this satisfactorily. Following is a resume of the actual results accomplished.

The Set on the Road

After getting the set working in the laboratory it was put in the car and several tests made in and about town using 180 volts of "B" battery. The tests were entirely satisfactory even to the fact that the signals could be copied letter perfect on a loudspeaker at 6YB while we were travelling 37 miles per hour. Reception was NG due to ignition interference and loose leads.

A few days later, March 15th to be exact, the set was again put in the car, very rigidly this time. The ignition system was very carefully shielded by winding heavy rubber covered wire around all the various leads and grounding these to the frame of the car. The ignition system on this car was a Bosh timer using the unispark system. It may not be as easy to cut out the interference from a standard Ford spark coil ignition system as the vibrators on the coils raise the devil in a receiver.[3]

The car battery was used to light the filament and a dry cell was placed in series to boost the voltage a trifle. The key on the steering wheel was disconnected from the horn and connected in the plate circuit. Right here it is well to emphasize one point. The frame of the key should be so connected that it will be on the filament side of the circuit. If it were reversed and then touched while the filament was lighted you would most certainly get a very nasty jolt as you are practically certain to be touching the metal body of the car at some place and therby completing the high voltage circuit through yourself.

The objective of this particular trip was Oracle, Arizona, about 32 miles northeast of Tucson by air line and also on the other side of a range of mountains over a mile high. The idea was to see whether we could work 6YB while at Oracle. The main reason for trying this test was because broadcasting from the University station KFDH had never been heard at Oracle and we wished to know the reason. Soon radio flivver 6BKA was in motion and Tucson was fading away in the distance. At 1 P.M. just as we left the city

PORTABLE STATION 6BKA

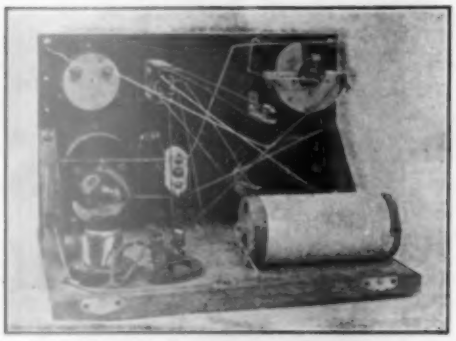
The Ingerbury wasn't left there by accident; it's to show the size of the set.

1—In other words at a capacity of 120 or 130 micromicrofarads. This seems a good time to say that 100 micromicrofarads is the same as .0001 microfarads.

2—In other words it will not do to use a jack-and-plug system or a twisted pair of wires.

3—A few hundred of us who have been working at 5 meters have learned to recognize the difference between the ignition noises made by a Ford, a unispark system and a regular high-tension magneto, provided the car carrying these things comes within a quarter mile of the 5-meter tuner. The Ford vibrator coil is by far the worst and seems to concentrate at about 7 meters wavelength although usually very broad.

limits and while we were travelling 25 miles per hour we opened up and called 6YD, being answered immediately by them. Due to shielded ignition system the interference was practically nil and reception was good. We stayed QSO until we reached the end of the pavement and about



THE TRANS-CEIVER[4]

The camswitch is used as a send-receive switch. Just below the samsDORLYIds escROPAT Z..GIb Just below the camswitch is the filament switch and a bit below that is the knob of the Bradleystat that controls the filament current. The lower jack receives the key plug and the upper jack receives the phone plug. The upper meter measures the current in the tuned circuit when the set is transmitting. The lower meters measure plate current and filament voltage. .The filament voltage is provided by the storage battery of the car plus a dry cell. .The A.C. voltmeter is corect for D.C. also.

The back view of the set shows the same instruments plus the R.F. choke coil, the grid condenser (on the base) and the plate condenser (on the slanting wooden panel-brace). The grid leak is a graphite potentiometer segment adjusted by moving clips along it.

6 miles out of town after which the road was too rough for good work. Not bad, eh?

The set worked like a top all afternoor and when we finally reached Oracle ano had a large mountain range between us we were still able to reach 6YB perfectly. As a matter of fact they copied us with a loudspeaker and typewriter. The receiver at 6YB was a regular oscillating detector with two stages of audio.

In operating the set we tuned it as a receiver to the wave of the station we were working and then were able to answer on the same wave as when transmitting. If interference was bad both stations could shift wave a little. If the operator at the other end happend to be listening a little off our wave we merely flopped the dial back and forth for a little while and then settled down on the original wave. That got a "rise" every time.

Before starting the trip we pasted on the windshield a little sign giving our calls, the purpose of the test, the wavelengths used and a brief description of the set, winding up with a fervent request that no fool questions be asked because we were busy. It worked beautifully except for one old gentleman who stopped and asked: "Well, how's the music, boys?"

At 4:30 we were still working 6YB from Oracle with ease. Several 5's in Texas and several 6's around Los Angeles and San Francisco were copied about this time but we didn't have time to raise them for we were anxious to get back to Tucson and tie on the nose-bag.

We caused several near-accidents to as many motorists by making them strain the rubber in their necks as we tore by at 45 per with strange contraptions all over the car. However, we wanted our supper and we didn't stop for anything except one tack.

4—"Trans-ceiver" — nice word! Invented some years ago by R. H. G. Mathews, Central Division Manager. This is the first chance we have had to use it.

Strays

Ward-Leonard resistance units are available in mounted form with almost any resistance and any number of contact points so that very smooth control can be had when they are used as primary filament heating transformer resistances.

Before shooting traffic to Canada take a look at your map, OM. Just because a "c" signs off don't think he can QSR direct to all Canada. We hear a lot of 8 stations giving tfc addressed to the Western Canadian coast to Montreal and Quebec stations. Look at the map.

6CMQ recommends the use of a storage battery on the filaments of transmitting tubes when it is impossible to get a good d.c. note out of the chemical rectifier. With the filament voltage flopping all around, the storage battery on filaments should help a lot.

Pyrex tubing, rod or plate can be soldered to by means of a soldering iron and some solder. Don't even need any flux!

Experimenters' Section Report

MUCH needless correspondence has taken place because prospective members of this section do not take the slight trouble to look at back issues of *QST* in order to find out how we are organized.

In point of fact we are very little organized. The only requirement for membership is an interest in experimental radio work. If you have that, and wish to work with others on the same problem, simply address a letter to "Experimenters' Section A.R.R.L., 1711 Park St., Hartford, Conn.," stating that you wish to join and giving your complete address. *No attention will be paid to letters signed with radio calls.*

A sending station is not necessary. An elaborate laboratory is not necessary.

Please do not put anything extra into the first letter. After you have returned the blanks and looked over the membership list you will be in better position to comment.

Experimental Reporters

Experimental work does not press-agent itself as well as actual radio communication does. The Technical Editor is anxious to hear from men willing to keep him in touch with the laboratory and test work in their region. There is no reward for this, there isn't any glory, but it will help *QST* greatly.

Television

The Bureau of Navigation has just notified us that experiments in radio television and radio picture transmission may be carried out under general amateur licenses without any special permits. The waves now indicated on the licenses must be used and the circuits must agree with the ruling of the Bureau as to loose coupling, etc.

The Classified Membership List

We must insist that the classified membership list will *not* be sent to those who have not enrolled in this section. Keeping this list up to date, classified by problems, and mimeographing it represents enuf work so that we cannot send out extra copies. Each member of the section is entitled to one copy however.

Problem Changes

In the absence of objections from members of the section the following problem changes will be made, effective July 15, 1925.

Problem A3—Test of Antenna insulators. To be dropped because the problem can be regarded as completed for the present C.W. set.

Problem A4—Development of a good lightning switch. Dropped because it is not possible to reconcile the conflicting requirements of the electrical protection of the station and the rulings of the various Underwriters' organizations.

Problem A8—Beverage wires at waves below 100 meters. Dropped because no interest has been shown by the men enrolled for this problem.

Problem R4—Comparison of headsets as to sensitivity. Dropped because the results are of no value. Manufacturers are not concerned with the results obtained by others, hence there is no incentive in this work.

Problems R7 and R8—Comparisons of Foreign tubes and radio apparatus with the American makes. Impractical and leading to no useful results.

Problem R9—Reception of C.W. sets on double and half-wavelengths. Obsolete since loosely coupled sending sets have come into general use at amateur stations. Broadcasting stations are less progressive but will follow the same path later.

Problem R12—Portable receivers. Absolutely no interest whatever on the part of the membership.

Problem T3—Causes and cure of unsteady waves. Causes pretty generally known at present, hence the remedy is available and no further experimental work is needed.

Problem T8—Comparison of plate supplies. Obsolete since modern tendency is toward D.C. in all cases for other reasons than those of range.

Problem T9—Can be regarded as solved in the affirmative.

Problem T10—See comment above on R7 and R8.

Problem T13—Mercury arc rectifiers. Abandoned because General Electric Co., etc., cannot be persuaded to sell the necessary mercury arcs.

Problem T17—How can D.C. tone be kept up below 100 meters? Obsolete since it has been discovered that the cause is audio-frequency fading which cannot be controlled at the station.

Problem G5—Distant Control. This problem is one that must be solved for each particular station, and therefore is not a good subject for this section. Ordinary relays, R.F. chokes, etc., will always do the work. It is nothing but a wireman's problem.

Problem G6—Breakin systems. No special thought needed here either. Several good systems have been described in *QST*.

New Problems Added

A9—Underground antennas. With special reference to static elimination.

G9—Resonance wave coils.

R14—Send-receive sets. Low power sets which use the same tubes for both purposes or else combine a compact sending and receiving equipment in some other fashion. The general idea is to make a compact set which is electrically good and yet has some range Cheapness (although not the main object) should be considered.

T19—Sending circuit tests of all sorts.
T20—Tests of all sorts in the 20 meter band of wavelengths.
T21— Tests of all sorts in the 5 meter band of wavelengths.
T22—Tests of all sorts in the 77 centimeter band of wavelengths.

Men are enrolled in all of these problems. If you wish to put yourself down for any of them please notify the Experimenters' section and *don't forget to give your full address.*

New Manuals

A number of new circulars are being prepared for this section. They will be announced through *QST* when done. Suggestions are invited in the meantime.

A Neat Loop

ONE of the neatest loops we have ever seen is the one shown in the photograph. It is 18 inches square and is collapsible. The wire is wound in a "banked" fashion, there being two layers in the complete winding. This banked effect is obtained in quite a different method. The spacing combs around which the wires are wound consist of two sets of slots cut in bakelite. One set is cut quite a bit deeper than the other. The outside layer is wound in the shallow slots and the inside layer in the deeper slots.

The loop is provided with a center tap binding post, making it useful for superheterodyne sets in which the first detector is made regenerative by means of the center tapped connection to the loop. The cross arms are pivoted in the center which slides on the lower vertical arm to open or fold the loop. In this manner the wires do not become tangled when opening the loop. The base pivot is held in a brass bushing in the base of the loop so that the loop will be perpendicular and will rotate easily.

This loop has a distributed capacity of only 33 uuf and a natural wavelength of 152 meters. Its resistance at 300 meters is 12 ohms. It is manufactured by the Radio Appliance Company of Chicago.

Picture Transmission Permitted Under General Amateur License

IN a conference at the Bureau of Navigation, Department of Commerce, on May 29th, it was decided to permit radio transmission of pictures and facsimilies under ordinary amateur licenses. Stations may use any wavelength for which they are at present licensed.

Amendment to Regulations

THE regulations governing amateur stations, dated Dec. 24, 1924, paragraph entitled "Intercommunication," have been amended to read as follows by Bureau of Navigation General Letter No. 265a, dated April 1:

Amateur stations are not permitted to communicate with commercial or government stations unless authorized by the Secretary of Commerce, except in an emergency or for testing purposes which may be construed to cover official government business. No variation of amaateur wave lengths is permitted and the amateur quiet hour restrictions must be observed. This restriction does not apply to communication with small pleasure craft such as yachts and motor boats, which may have difficulty in establishing communication with commercial or government stations.

The Bureau has confirmed our understanding that the meaning of the phrase "for testing purposes which may be construed to cover the official government business" is such as to lend approval to such tests as A.R.R.L. members are now conducting with NRRL, NKF, etc., the chief thought having been to prevent violations of regulations by encouraging unauthorized operation by government operators.

The phrase "no variation of amateur wavelengths is permitted" means that even though amateurs are in communication with government stations, they are not permitted to use other than the wavelengths allocated for amateur use; but the shifting of wavelength within the amateur bands of course is not prohibited.

The Bureau has extended the application of the last sentence of the amended text to cover the handling of communications with this summer's MacMillan Arctic Expedition, in the same manner as communications were held during the previous expedition.

—*K. B. W.*

Strays

5VL says that an excellent solution which will clean dirty rectifier elements and jars can be made from 32 oz. of water (distilled), 2¾ oz. Bichromate of Potash and 3½ oz. Sulphuric Acid. This formula was supplied by the Eastman Kodak Company.

Charles E. Manierre suggests that the tube capacity of the Myers type of receiving tube can be kept at its lowest minimum if no socket at all is used. Bend the four soft wires, which form the tips in the composition plug, at right angles to the tube and solder the connecting wires directly to these "lead-out" wires on the tube. The tube is so light the connecting wires will act as a support.

Last Notice ! ! !

Mid-Summer Tests on Short Waves

By the Traffic Department

WHAT ARE THE TESTS FOR? To see if we can't learn something about the behavior of short waves, especially those on five and twenty meters.

WHEN WILL THEY BE HELD? The last two week-ends in July, and the first week-end in August.

ON WHAT WAVELENGTHS? July 18 and 19, July 25 and 26, and August 1 and 2.

July 18 and 19 .... 38 to 42 meter band
July 25 and 26 .... 19 to 21 meter band
(The band given in the June issue for this date is 25 to 26 meters, but is NOT correct. 19 to 21 is correct.)
Aug. 1 and 2 ..... 4.8 to 5.3 meter band

WHEN DO THEY START? The tests start at 1.00 A.M. Saturday morning.

WHAT STANDARD TIME? Your own standard time. (E.S.T., C.S.T., M.S.T., P.S.T., etc.) If outside the U.S., take your own local time.

WHO CAN PARTICIPATE? Everybody. If you have a receiver only, we want you to listen and make notes on transmissions. If you have a transmitter, transmit during the free-for-all period, unless you are one of the special test stations chosen by the A.R.R.L. Traffic Department, in which case you will transmit during the restricted period. Transmit a code word of your own (which should be sent in to us here at Headquarters) and intersperse it occasionally with your own "straight" call.

A BRIEF DESCRIPTION OF THE NATURE OF THE TESTS. Starting at 1.00 A.M. on Saturday morning (local standard time) the tests run as follows:

LOCAL STANDARD TIME

A.S.T., E.S.T., C.S.T., M.S.T., P.S.T., G.M.T., etc.

(If you are on daylight saving time send your tests one hour later than this schedule.)

Restricted Period	
0100-0130	1-1.30 A.M.
0500-0530	5-5.30 A.M.
0900-0930	9-9.30 A.M.
1300-1330	1-1.30 P.M.
1700-1730	5-5.30 P.M.
2100-2130	9-9.30 P.M.
Free-for-all Period	
0130-0200	1.30-2 A.M.
0530-0600	5.30-6 A.M.
0930-1000	9.30-10 A.M.
1330-1400	1.30-2 P.M.
1730-1800	5.30-6 P.M.
2130-2200	9.30-10 P.M.

This means that if you are, for instance, in the Eastern Standard Time belt, and are transmitting during the free-for-all period, you send from 1.30 to 2.00 A.M. Saturday morning, and repeat this transmission once every four hours thereafter until 9.30-10.00 P.M. Sunday night, when the tests are over. Any one station will, if on the air for every transmission period, transmit a total of twelve tests, each four hours apart.

LISTENING FOR TESTS: Please do not adopt the policy of simply transmitting during your transmission period, and then leaving the set and doing something else until your next transmission period comes around. It will do no good for everyone to transmit unless everyone also listens.

Therefore, listen carefully for the other fellow's signals during the three hours that your station is off the air.

As stated in the June issue, the proper procedure is to log a number of stations on the particular band at which transmission is taking place, and then, four hours later, to refer to the log and listen for THE SAME STATIONS. Note changes in audibility of these stations from four-hour period to four-hour period. In the write-up of these tests, which will appear in *QST*, the amount of credit you will get depends entirely upon the degree to which you have followed these suggestions.

We would rather have a GOOD log of the transmissions of half a dozen stations during the 48-hour period than a log that says, "I heard the following stations on 40 meters (or 20 meters or 5 meters) during the test." Such a log will be worth exactly nothing.

DON'T FORGET TO LISTEN DURING THE FIRST HALF-HOUR OF EVERY HOUR FOR THE "RESTRICTED" STATIONS. These will probably be your best stations to listen for when it comes to making continuous logs and comparing results for audibility, fading, etc., because these stations ABSOLUTELY WILL BE ON THE AIR every four hours for the entire period of the test.

As a last word, go back to the June issue of *QST*, turn to page 47, and read the article on the tests there.

All right, fellows, you now have all the information; the rest is up to you. If you do your part, the tests will go a long way toward furnishing us with some real information on the short waves. Don't let these tests fall through as did the Governors-President relay this year.

MAIL ALL LOGS TO HEADQUARTERS IMMEDIATELY AFTER EACH TEST.

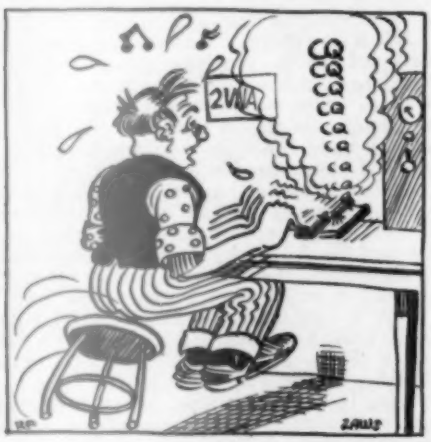
The "CQ" Fiend

By T. Carter

WHEELER of 2VNA was a "CQ hound"; he admitted it himself. He would hit the operating chair with a CQ and leave it the same way. He had it down so pat he could carry on a conversation with anyone who happened to be in the room, send twenty CQ's, sign off 2VNA fifteen times, and QTC? ten times without a break.

Hams within a radius of a thousand miles swore at him via letter, radio and word of mouth although the latter injured no one but those in the immediate vicinity of the explosion. But Wheeler grinned and went on merrily "CQ-ing".

One evening Wheeler sent out so many CQ's his hand became temporarily paralyzed; he could send but twelve CQ's without a break and couldn't sine off at all. After several vain attempts to get over the twelve mark he resigned himself to the inevitable. His heart was broken. Tears sprang into his eyes. He lovingly patted the key and turned off the transmitting tubes. His eyes were filled with anguish



and his head was bowed with sorrow. Ye Gods! The irony of it! No more CQ's until tomorrow night!

While in this frame of mind Wheeler absently turned the dials of his receiver and tuned in a broadcasting station. He settled back in the chair and listened to the strains of the dinner concert from KDKA. He had been enjoying the concerts for about ten minutes when suddenly the music stopped; he turned the dial and was surprised to note that all the broadcasting stations had stopped. He turned the dial up to 600 meters, then sat up quickly and reached for a pencil.

"SOS SOS SOS DE KEG KEG HR On fire; require immediate assistance; position is ....."

"CQ CQ CQ CQ CQ de AS MIN"

Wheeler threw the pencil down and swore: "Who the devil is that sap that sent out that CQ at such a time and on *600 meters at that*; bet no one got KEG'S position." He took up the pencil again as WCY opened up.

"QRT QRT SOS SOS BK KEG KEG DE WCY WCY WHAT IS YOUR POSITION?" "WCY WCY DE KEG R HR FIRE IN HOLD. POSITION IS ....."

"CQ CQ CQ CQ CQ DE 2VNA 2VNA 2VNA QTC? QTC? KK"

Wheeler gripped the edge of the table and his face turned a pasty white. What did it mean? 2VNA was *his call*; and he had no license to work on 600 meters. What was more he *wasn't* working his set. He glanced toward the transmitter and was horrified to see both tubes lit up brightly. He reached for the snap switch that controlled them and turned it but the tubes remained lit. He turned it again and again with same results. Beads of sweat formed on his forehead. Then WCY broke in again.

"QRT QRT SOS SOS BK KEG KEG DE WCY WHAT IS YOUR POSITION PSE?"

"CQ CQ CQ CQ CQ CQ DE 2VNA 2VNA 2VNA QTC? QTC? KK"

Wheeler fell back weakly into the chair with horror written on his face; because, as the CQ was being broadcast, the antenna ammeter on his set had registered in synchronism with the dots and dashes sent.

"WCY asked for KEG's position again to which KEG answered:

"WCY de KEG Too late OM bow awash and .....GB (meaning good-by)"

Wheeler heard this last message as though he were in a trance and, when he finally raised his eyes, he was horrified to see a tragic face straining at him from the receiver. Wheeler's hair rose and he felt a chill run up his spine. He gripped the chair and was about to rise when the face spoke.

"You murderer!" it moaned in a hollow voice. "You have been the cause of the death of fifty men. Through your thoughtlessness you have sent fifty men to a watery grave. Through your disregard for others you have delivered a member of your Radio Fraternity to the sea. But," and here the voice rose to a scream, "I shall deliver you into the hands of two pests. Behold!"

As he said this, two little figures jumped out of the receiver. One was so tall and skinny he stood bent over like the letter "C". The other was just the opposite; so fat his head couldn't be seen and with a tail swinging out to one side so that he looked not unlike the letter "Q".

"My God," groaned Wheeler, "C and Q".

"Yes, C and Q," said C in a shrill voice.

"We shall torture you like you have tortured us," roared Q. So saying they both jumped on Wheeler's shoulders, and while Q jumped in one of his ears and roared as loudly as he knew how, C stretched himself across Wheeler's head from ear to ear and tightened his body like a clamp.

Wheeler clawed at his head but couldn't budge the two pests. And all the while Q was roaring and C was pressing Wheeler's head tighter and tighter. Wheeler kept writhing in the chair unable to leave it or stop the depredations of the two pests. After a while C tired of his clamping activities and began pulling Wheeler's hair; but this was his undoing. He had to stand up to do this, so when Wheeler swept his hand across his head in an attempt to dislodge C, he caught the squealing Imp between his fingers and started pulling. But the more Wheeler pulled the tighter C would grasp his hair until Wheeler thought his whole scalp was coming off. And, during all this, Q was in Wheeler's ear yelling his little head off.

Wheeler was desperate now, so, oblivious to consequences, he grasped C firmly and tugged with all his might. With a squeal of fright C let go of Wheeler's hair; when Q heard C's squeal he recognized the danger and scampered out of Wheeler's ear, jumped to the table and ran into the receiver. Wheeler fell back in his chair, exhausted.

When he opened his eyes again he stared around him and then sat up with a jerk, his eyes full of fright. He had a pair of phones grasped so tightly in his right hand that the headband was broken; several strands of hair were twisted in between the adjusting nuts.

Just a dream; but such a dream. Suppose all that had been real; the death of fifty men laid at his door just on account of his foolishness. He shivered and laid the phones on the desk.

After a few minutes' thought Wheeler reached up to the shelf above the instruments and took down the call book. Turning to the list of International Abbreviations, he found "CQ". He took his pocket knife, opened it, and cut around the "CQ". Then lighting a match he set the flame to the bit of paper and watched it until it turned to ashes and blew away.

"The death of 'CQ' as far as I am concerned. May 'they' rest in peace," he murmured to himself.

A.R.R.L. Information Service Rules

1. Before writing, search your files of QST. The answer is probably there.
2. Do not ask for comparisons between advertised products.
3. Be reasonable in the number of questions you ask.
4. Put the questions in the following form:
   A. Inclose a stamped and self-addressed envelope. Envelope without stamp from foreign countries.
   B. Make diagrams on separate sheets and fasten sheets together.
   C. Number the questions and make paragraphs of each.
   D. Print the name and address (NOT merely call letters).
5. Address all questions to Information Service American Radio Relay League, 1711 Park Street, Hartford, Conn.
6. Keep a copy of your question and diagrams and mention that you did.
7. State whether or not you subscribe to *QST*.

Book Prizes Also

A telegram just received from Mr. C. Francis Jenkins is as follows:

"THIS CONFIRMS MY ORAL OFFER OF YESTERDAY TO EVERY MEMBER AMERICAN RADIO RELAY LEAGUE SENDING ME SUGGESTIONS FOR IMPROVEMENT METHODS OR MECHANISMS FOR TRANSMISSION OF PICTURES, SKETCHES, MESSAGES BY RADIO. I WILL GIVE COPY MY BOOK "RADIO PICTURES" IN ADDITION TO CASH PRIZES OFFERED EVERY 30 DAYS FOR BEST SUGGESTION.
C. FRANCIS JENKINS."

Strays

The Headquarters office outgrew the old 1045 Main location and has moved to much larger and more modern quarters at 1711 Park Street. We've got plenty of room now, and the building is a brand new one. Cum on and see us gang.

— - - -

The Peerless Electric Company of Minneapolis is doing a C.O.D. business on radio parts. They carry a full line of ham transmitting apparatus which can be ordered via radio.

— - - -

". . . . they provide a free *bath* for radio frequency currents." Pop. Radio, page 5 June. Hi! Now we know why condensers are sometimes leaky.

— - - -

A British ham's description of ham work: "Sitting up late at night and hoping for the best."

The X-L "Vario-Denser"

A VERY neat little neutralizing condenser is manufactured by the X-L laboratories and sold under the name of "Vario-Denser". The condenser consists of two pieces of nickel-plated brass strip three eighths of an inch wide moulded into a brown bakelite "box". The illustration shows a cross section view of one of the condensers. The capacity variation is secured by means of the large screw which turns in moulded threads in the top of the bakelite. This screw pushes the upper strip

down toward the bottom and varies the capacity from a minimum of 1.8 μμf to a maximum of 20 μμf. The plates themselves extend out of the case and act as terminal lugs to which connections can be soldered. As the device is practically moisture-proof its capacity will not change with the weather. It is designed primarily to act as a "neutrodon" in radio frequency sets. When used as such it is possible to quickly neutralize the set, as the capacity can be varied very easily and rapidly.

Don't Forget the Cups

APPARENTLY the entire membership of the American Radio Relay League (which means all of our subscribers) is under a misapprehension about the award of the cups for the various wave bands as announced in the January issue of *QST* on page 17.

In the first place we are not receiving enough entries and in the second place the ones that we are receiving are basing their claims entirely on the distance over which their stations are reaching.

This is a mighty poor basis on which to expect the award of a cup. We are firmly convinced that anyone using a 201-A tube will reach as far as any station whatsoever if he will just keep at it enough hours of the day and enough days of the month Such things may indicate persistence but that is absolutely all that they do indicate. There are two real things that a station can do these days, development work and traffic.

Development Work

Under the heading of development work there come two things, surveys into unknown regions of wavelength or time and development of circuits and apparatus. A magnificent example of this type of work has just been presented by the leading article of our May isue, namely "Pioneer Short Wave Work." It is the Technical Editor's opinion that in the history of *QST* no finer piece of work has ever been described than this.

Traffic

At the present time our traffic is very much in need of improvement. We handle a great many messages but we handle them neither fast nor accurately. The pair or string of stations which will turn up with a record of having handled accurately, completely and consistently a considerable volume of importance will certainly receive consideration if they can prove that the messages were delivered.

The Wave Bands

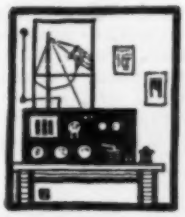
In picking the waveband you choose to work on, it is natural that you should think of the adaptability of that band for the particular thing you may be interested in. At the moment we would say that the traffic handler will do well to leave 5 meters and .77 meters alone. On the other hand these are the richest fields for the man who desires to do development work.

Let's Go!

Whatever you are going to do, start to do it now. Organize your test system, get your measurements underway, or initiate that traffic route. But whatever you do, don't take a stack of call cards too seriously. They may be interesting as a side-light on the performance of a station but they are not the main thing.

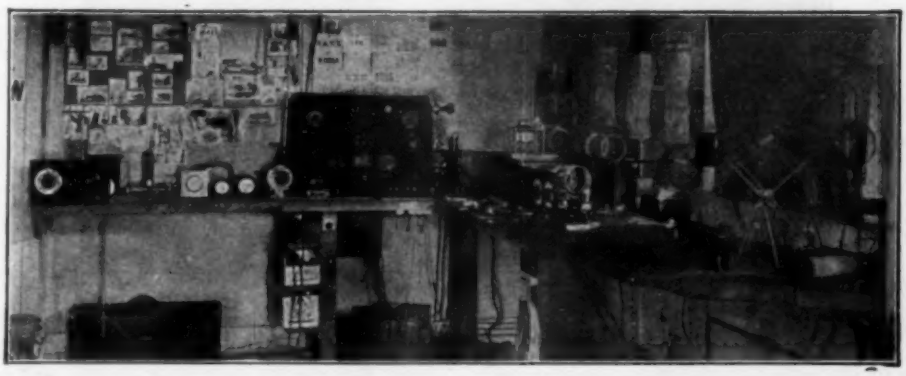
Strays

Radio Journal, the Pacific Coast magazine, has changed hands and has come under the ownership of our good friend M. E. McCreery, 6LJ. The Associate Editors are Jay Peters, 6BEV and B. Molinari, 6AWT. Under McCreery's editoriship it seems certain that Radio Journal will be full of live amateur material. Luck to you, OMs.



Amateur Radio Stations

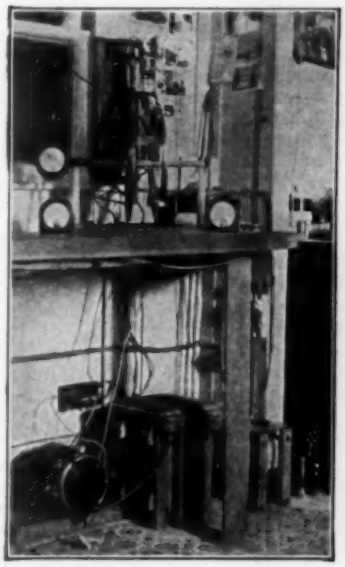
6ZH, San Ysidro, Calif.



OWNED and operated by Lester Picker, 6ZH has always been a consistent performer and has been going for a number of years. The latest layout is shown in the photo above. The 50-watt transmitter which appears at the extreme left of the photo is tuned to 85 meters, but is seldom used. Next to the right is a 20-watt C.W. and a 10-watt phone set. This outfit has been inoperative for some time.

The receivers consist of a modified Reinartz (enclosed in the cabinet) for the 150-200 meter band and a good low loss receiver using the same circuit for short wave lengths. The main transmitter, seen at the extreme right, consists of a 250-watt tube in a coupled Hartley circuit. Pancake inductances are used in both primary and secondary circuits. The grid and plate condensers are homemade and are glass plate and copper shim. The plate transformer is a G.E. pole transformer with sectional primary and secondary coils giving voltages up to 6,600. The plate supply is fed to the tube through an Advance Electric Company's synchronous rectifier. On 76.5 meters with 2,200 volts and 160 mils the antenna current is 2.8 amperes and with 3,300 volts and 230 mils the antenna current is 3.8 amperes. This power is not used often and is never used early in the evening during broadcast hours. Quiet hours from 8 to 10:30 P.M. have always been observed.

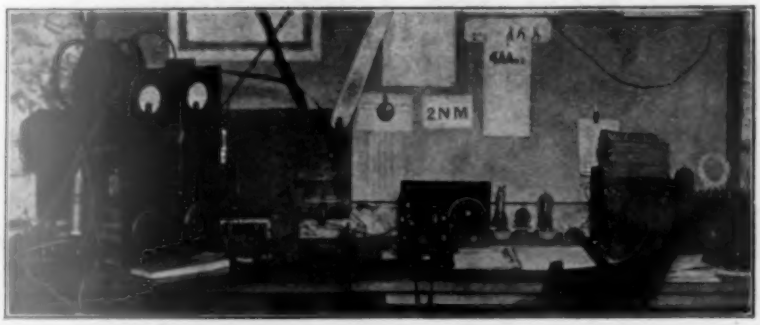
The antenna is a single vertical wire with a 12-inch copper ball at the top. The length is about 55 feet. The counterpoise is a single wire 40 feet long and 10 feet off the ground. The antenna and counter-



poise are insulated with two 18-inch glass towel-bars in series. The lead-in is brought in through a window pane. Long oak insulators boiled in paraffine are used to break up the guy wires.

6ZH has been heard in South Africa, England, Scotland, Argentine, Panama, Cuba, Alaska, Australia and China while New Zealand, Japan, Philippine Islands, French Indo-China, Hawaii, Porto Rico, Canada and Mexico have been worked. Picker is noted for his good fist, his excellent and courteous operation and his all-around enthusiasm. More power to you, OM!

8BYN, Columbus, Ohio



8BYN is too much of an experimental station to remain dolled up for any length of time. The photo represents one of the latest stages of its development. Howard Storck of 694 Carpenter Street, Columbus, Ohio, is owner and operator and is one of the old old-timers, starting in the game in 1908.

The present transmitter is a very good example of the experimental type of panel set. All of the parts are mounted so they can be gotten at with the least amount of trouble; the inductances are up in the air and mounted so that the losses in them are minimized. The set uses one 50-watter in a split-secondary inductively coupled Hartley circuit. Plate supply is obtained from a 900-watt Thor transformer whose output passes through a 52-jar chemical rectifier and a large brute force filter. The filter consists of the secondary of a large pole transformer and a condenser of three μfd on each side of the choke. The note is invariably reported as being D.C. Keying is done in the center tap to the filament transformer. An R. F. choke is in series with the key, which is shunted by a high resistance. This method of keying, plus the coupled circuit, eliminates all key thumps. Demountable inductances are used, and the set operates satisfactorily on 80, 40 and 20 meters. A 50-watt 5-meter transmitter is now under construction.

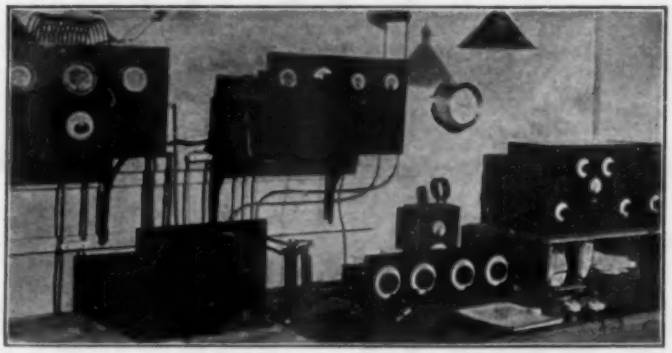
The receiver is a low loss affair using one stage of audio frequency amplification. Regeneration is controlled by the variable by-pass condenser method. An old pre-war Audiotron tube is the detector. It works like a charm except that it can't be made to oscillate at 20 meters!

The antenna system consists of a twin-cage, flat top 60 feet high at one end and 40 feet high at the station end. The counterpoise is a 9 wire fan type 12 feet off the ground. The antenna and counterpoise are insulated with long Ohio Brass porcelain insulators; the lead-in wires enter through Pyrex tubes and all wiring is supported, where necessary, by glass insulators.

8BYN has a large list of DX including two way communication with New Zealand, Hawaii, England, France, Italy, South America, Cuba and other countries. Storck's prime interest, however, is not in DX but in A.R.R.L. traffic work and in experimental work. Yes, he signs "R.C.C." also.

DEAR, WILL YOU SAY THOSE THREE FORTY EIGHT QUICK—I'M WAITING FOR THEM HERE.
GOSH, HAZEL, IT'S QUIET HOUR! THAT TEN-THIRTY TRAFFIC DON'T GO NOW! I CAN!
LET'S GO IN OUTSIDE, DEAR!
R.R.L. OR CAT

1AF-1XJ, Cambridge, Mass.



THE Harvard Wireless Club was founded in 1910 and has had stations in various locations developing from the growling rock crushers on 300 meters to the whistling bottles oscillating on 40 meters.

The officers of the club this year are W. C. Bohn ex-2TP, President; Harris Fahnestock, jr., 1BBO, Secretary; H. P. Thomas, 1AMW, Chief Operator; T. E. Graves, 1KZ, Treasurer. There are thirty operators in the station personnel, all of whom are enrolled in the University.

The present station was erected last fall and went into operation in the middle of January. It is located on top of the stadium on Soldiers Field and consists of a shack twelve feet square as an operating room and two 55-foot gutter pipe masts. The antenna is a single wire having a total length of 120 feet, 50 feet above the stadium and 120 feet above the ground. A four wire counterpoise 100 feet long is used, but works best when grounded directly to the steel frame work of the stadium.

The apparatus as shown in the photograph, from left to right, consists of a 40- and 75-meter transmitter, power control panel, 150- to 200-meter transmitter, 65- to 200-meter "low loss" receiver, 30- to 70-meter "low loss" receiver and a Kennedy 180- to 20,000-meter receiver and two stage audio frequency amplifier.

The short wave transmitter uses two 50-watt tubes in a push-pull Hartley circuit operating on harmonics of the antenna. The 150- to 200-meter set can be used with D.C., self rectified A.C. or phone and can use from one to four UV-203-A tubes in various circuits. Plate supply is obtained from a transformer with "S" tube rectifiers and filter.

The station has been in operation for six months during which time many foreign countries have been worked. An average message total of 140 messages per month has been maintained.

Rag Chewers' Club

OPERATORS of the following stations have been duly nominated and selected for appointments in the Rag Chewers Club: 1ASN, 1BAO, 1BHW, 1DQ, 1ES, 1ID, 1KP, 1KY, 1MK, 1OA, 1OX, 1VC, 1XAQ, 2AEY, 2AFC, 2AFG, 2AGQ, 2CPD, 2CRB, 2CRP, 2EG, 3BVZ, 3LL, 3QP, 3UT, 3VT, 3XAN, 3ZI, 4JR, 4OA, 4VQ, 8AWS, 8BYN, 8CEO, 8ZU, 9AEK, 9BAA, 9KW. By order of The Old Sock these stations are appointed RCC stations and the operators thereof have been duly entered upon the roll of the clubs membership.

A number of applications have been held up because the applicant did not adhere to the rules set down in the "Constitution" which appeared in the June issue of *QST*. You must chew the rag with a station that is already a member of the RCC and both the new applicant and the RCC member must write Headquarters confirming the rag chewing.

Owing to pressure along other lines we have been unable to carry on the organization work. We have, however, been lucky in getting the services of a whizz of a rag-chewer who by acclimation has been officially appointed and recognized as The Old Sock, Chief Rag Chewer. Membership certificates have been mailed to all members. Come on in gang! In the future all communications to the RCC should be addressed to The Old Sock, Rag Chewers Club, care A.R.R.L. Hartford, Conn.

I.A.R.U. NEWS

Two way amateur communication for the first time between South Africa and the outside world was established on April 6th when oA4Z, the station of Mr. J. S. Streeter at Observatory, Cape Town, South Africa and rCB8, Carlos Braggio of Buenos Aires were QSO for 17 minutes. CB8 was on 63 meters and A4Z on 95 meters. The transmitter at A4Z is a single Phillips ZY valve working in a four coil Meissner circuit. Input to the tube is normally 105 watts. The antenna is only a single wire 50 feet high and 38 feet long, counterpoise a fan shaped affair of 6 wires 55 feet long. CB8 has been described several times in past issues of *QST*. He is now down on 35 meters and is being heard over the whole U. S.

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All official correspondence relative to radio matters in South Africa should be addressed to the Postmaster General, Pretoria, S. Africa. Unofficial matters—letters, notes and QSL cards—addressed to individuals whose QRA is not known, should be sent to the Radio Society of South Africa, P.O. Box 43, Simonstown, Cape Province.

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The British amateurs have two new bands around 20 and 40 meters. A great number of British stations are working to the U.S. on 20 meters, both day and night.

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u1BDX, Barre, Vermont worked Brazilian 1AB, the station of Alvaro S. Freire, Icarahy-Nictheroy, E. do Rio, Brazil, early in the evening of May 18th. 1BDX was on 40 meters and 1AB on 37.

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The following are the QRA'S of some of the new short wave commercial stations in operation: WHD, Westinghouse, Sharon, Penna. on 49 meters; KEL, Radio Corp., Bolinas, Calif. 95 meters; KIO, Radio Corp., Kahuku, Hawaii, 90 meters; WRB, E. G. Watts, Miami, Florida, 68.4; WRP, ditto, Pinecrest, Florida, 68.4 meters; WIR, Radio Corp., New Brunswick, N.J., 86.16 meters; WIZ, ditto, on 43.02 meters; WQN, Radio Corp., Rocky Point, N.Y. 74.03 meters; WQO, ditto on 35.03 meters. Watch them all flock down to the shorter waves.

The general licenses for operation of amateur stations in New Zealand, as of April 1st, call for wave lengths between 120 and 160 meters. The New Zealand fellows ask us to QRX for them up to 140 meters. Special permits are issued for operation on the shorter wave lengths.

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The Soviet government station RDW at Nijni Nowgorod, Russia, is reporting to be operating between 75 and 78 meters. They are supposed to have a 20 K.W. set. It also signs "NRL" at times.

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Also u2ANM hooked up with nONL on 35 meters on the night of May 6th. ONL asks that the gang hunt around for him on waves between 35 and 40 meters, as he is having a hard time raising many fellows down there.

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SAZ, Spitzbergen, has dropped down to 60 meters and for the first time in radio history satisfactory commercial contact be-Spitzbergen and Stockholm is being had.

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NWQ is the U. S. S. New Mexico with the Pacific Fleet out around Honolulu. We understand she has a short wave C.W. transmitter on board.

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PKX, Java, the high power long wave station of the Dutch Government has been using short waves to work Holland. Their wave is around 50 meters. It will be remembered that PKX has about 2,300 K.W. power available for the high power arc set generally used. On account of most severe QRN they have found it necessary to use power on the order of this amount in order to maintain constant communication on the high wave lengths.

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On May 11 u6HM took a msg from 6ZAC, Cliff Dow in Samoa, for Washington. 6HM wired the message to Washington,and received a reply which was given to KFUH at Honolulu the next day. KFUH relayed it to 6ZAC. KFUH is the yacht "Kaimiloa" out of Honolulu for the South Sea Islands.

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The rush of 20 and 40 meter DX work, both day and night, is on. It is almost impossible to keep track of the different

stations who are working on these wave lengths. 6LJ, McCreery of Los Angeles seems to be the first U. S. station to be QSO with New Zealand on 40 meters, when he and z4AG connected on the night of April 6th. Also it appears that 6LJ's signals were the first daylight signals (all the way) to get through from the U. S. to Australia when a2DS copied him on 20 meters on the afternoon of April 20th. 6LJ using "one fifty-watter" with an input of only 100 watts.

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April 12 at 1 P.M. 8GZ-8ZG worked g2VW on 20.8 meters. 6CGW follows on April 12 working a 2DS on 40 meters. Then 6AWT comes in and works z4AG on 40, and j1AA on 40 for an hour. 6XAG also worked j1AA on 40 on this same night.

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On the morning of April 9th 1CMP-1PL worked JA2 in Japan on 80 meters. On April 18th they worked z4AG for an hour. 1 CMP QSY'd down to 20 meters but unable to work him on this wave. April 20th 9DAT is QSP z4AG on 40 meters.

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Probably the first two way work across the Pacific in daylight was done on April 24th by 6OI on 20 meters, connecting with j1AA who was on 22.5 meters. 6OI has also been QSO X-7QS, an 80 meter set on the ss West Jena while she was lying at Yokohama, Kobe and Shanghai.

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u8DO on 40 meters worked z2XA on 48 meters on May 8th. z2XA is Mr. E. A. Shrimpton, Chief Telegraph and Telephone Engineer, Post & Telegraph Department, Wellington, N.Z. His home address is 38 Rongotai Terrace, Wellington. He, by the way, is the "Terrell" of radio in New Zealand.

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Two transmitting licenses have been issued in Bermuda, one to Major W. Cookson of Hamilton and the other to Mr. W. F. Hoisington, also of Hamilton. Major Cookson's call is BE1, and Hoisington signs BER. The latter is ex-1AJW and has been down in Bermuda for quite a while. Incidentally he is kicking up quite a rumpus on 40 meters.

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The sailing yacht Idalia of the San Francisco Yacht Club has been equipped with a short wave transmitter, signing KFVM, for use when she enters the San Francisco to Tahiti sailing race which starts from Frisco on June 10th. The Idalia will not be back for four or five months and desires to communicate with amateurs. The transmitter is a master oscillator-power amplifier set using four 50-watt tubes and will operate on 40 and 80 meters. The gang is asked to QRX for KFVM between 11 P.M. and 1 A.M. P.S.T. after June 10th. The Auxiliary Schooner Eloise, also flying the San Francisco Yacht Club's flag will be equipped with a 50-watter on 40 meters. Call letters have not been assigned.

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u1ID, Glastonbury, Conn., worked two way with nONL for an hour on the night of May 20th on 40 meters. nONL is the call of J. Westerhoud, Jr., Amsterdam, Holland.

HOW TO JOIN THE I. A. R. U.

APPLICATION BLANK

Executive Committee: 1925
International Amateur Radio Union,
1711 Park St., Hartford, Conn., U. S. A.

Sirs:

I am interested in the objects of the International Amateur Radio Union and desire to become a member. I agree, if elected to membership, to abide by the Constitution and regulations of the Union. I attach $1.00 covering my first year's dues.

.....
(Name)

.....
(Street or Box Address, etc.)

.....
(Town) (State)

.....
(Country)

(Remittances should be made payable to The International Amateur Radio Union.)

The Traffic Department

F. E. Handy, Acting Traffic Manager
1711 Park St., Hartford, Conn.

Operating Your Station

By A. W. McAuly, 8CEO

DID you ever listen to NKF transmitting on forty meters on a Sunday afternoon working hams? Did you notice a contrast between his work and that of the average amateur, so marked that you could tell the difference before he signed? Do you not occasionally pick up a ham whose method of operating is so clean cut, so devoid of useless effort, so systematic, that your respect is gained at once and you probably reach the conclusion that he must be a commercial "op" with a set of his own?

Where does this difference come in? What do these operators do that we amateurs fail to do? What do we do that they avoid doing? Can we not, with a little effort, change our style of operating so that amateurs of other countries at least will not have so much criticism to offer?

Surely we can. There is nothing more to it than there is to breaking any bad habit or trying to form a good one. The first thing needed is the *will* to do it. If we really desire to become good operators we can do so, but the chances are a hundred to one that unless we actually work with that end in view when we start in the game, we will become very poor operators instead of passably good ones. We should make a decided effort to become better operators even after we have reached the point where we feel proficient. Why? What for? This game is our hobby. Do we want to make work out of it? No, not at all, but improved operating will not make the game any more like work than it is now. In fact it will be less like it, because it will be productive of better results. Any game worthy of a name must be organized and have certain rules which must be obeyed. Do rules make the game any less interesting? On the other hand they make it more interesting. When we sit down in front of the little old set what do we want to do? We want to "work" somebody. Any station will do if we have no traffic on the "hook".

What does the average amateur do when he wants to work any station?..... Yes, you said it! He doesn't even hesitate to send it and he makes it altogether too long.

What does our *good* "op" do? He puts on the phones and *listens in*. He combs the scale from one end to the other, back and forth for several minutes. Did you ever notice that when you hear the fellow you respect so much he is almost always calling some particular station instead of using the "inquiry signal"? Why is this? Because he *listens* until he hears someone whom he wants to work and *then* goes after him—our good operator gets his man nearly every time. He gets the station he calls because he chooses the proper time to call, because he makes good plain letters, and because he doesn't call too long. The good operator knows that long calls are unnecessary. The receiving operator will hear the call if he listens on the proper wavelength. A short call will be sufficient, for if he is not getting the signals it is likely that he is probably listening to another station. A long call makes the receiving operator lose patience and look for someone else. This happens frequently. You have probably noticed it yourself.

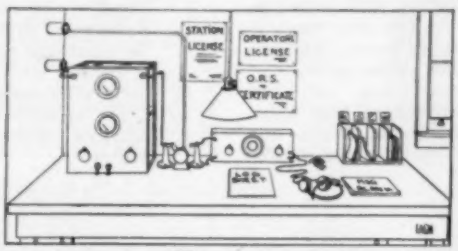
The good operator sends slowly. His signals are not of the "ten words per minute" variety, but they are slow enough so that there is no mistaking what he says. What percentage of the "fast senders" command your respect? The other day I heard a fellow with a vibroplex adjusted to send at *high speed* sending each word twice. A slower, heavier style of sending would have been easier to copy and my respect for the individual would have been doubled. There are times when two fellows who work each other regularly and are used to each other's style can use high speed keys to advantage. The average amateur only makes a mess of it. "Bug" keys are certainly not for general amateur use. Did you ever log a real long distance call when the fellow was using a "bug"? I never did! The chances of

being heard in foreign countries will be many times more favorable if you will sign slowly and carefully.

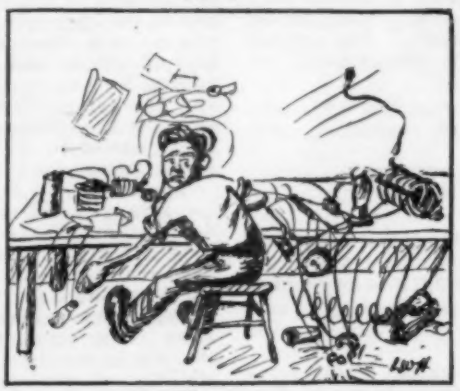
Another reason why the good operator gets his man oftener than others is because he adjusted his tuner properly after calling, to catch the signals in case the wavelength has shifted at the transmitting end or the receiver has jarred slightly out of tune. The dial setting has been logged and the good receiving operator, after waiting a moment, tunes a little above or below this setting. He has patience to wait a few minutes in case of delay at the transmitter, or in case fading signals make a second answer necessary. Sometimes we fail to hear the answer even though we are on the other fellow's wavelength, but we hear the two stations working together a short time later. The good operator stuck longer than we did, that's all.

The good operator does not find it necessary to call three times and sign three times between messages or when he wants the other fellow to go ahead.

A simple "K" and his own sign once is sufficient. The one sign tells the other operator that he has been copying the right station in case the signals have faded out and swung in again. The good operator "sends "words once" unless asked to QSZ, and he sends no faster than he is sure the other fellow can copy without trouble. The other fellow's call followed by the station call is sent once at the beginning of each transmission to give the receiving operator a chance to retune slightly if necessary before sending any words or numbers that should not be missed. However, no time is wasted in making long calls and signs. The good operator attends to the business at hand and gets a lot done without much noise and unnecessary procedure.



THIS



OR THIS

Did you ever hear some fellow say, "I never hear so-and-so any more. I guess he must be off the air"? Yet his traffic report shows that he is very much on the job. It is probable that the boy is handling his traffic on schedules and doesn't sign more than two or three times in an evening. He keeps a good clock, an excellent wavemeter, and pays attention to his schedules. He is ready for his bit of traffic or tests with a station of his kind at a predetermined time. He doesnt' muss the air all up with countless CQ's and long signs. When you *do* hear his signals you hear him "working" someone.

How many times do you hear a good station discontinue work because of a little QRM from a station nearby? Sometimes it is necessary, if the local is absolutely unreasonable. A good "op" keeps the transmitting operator ready for a "ga" signal, takes traffic until the local interference starts again, gives the sender the last word received while the interference is going, and is ready to take the "repeat" at the proper place when the local stops again.

Did you ever wonder why some fellows seem to be so successful when their signals are not strong at all? Good operating has a lot to do with that, but good operating is not entirely confined to what we do with our keys. Our choice of waves, our use of power, and the adjustment of our transmitters and receivers influence our success in operating.

Most of the time we are prone to use more power than is necessary. We often use so much power that we spoil the characteristic of our signals, make the wave unsteady, cause unnecessary interference among our neighbors, and shorten the life of our tubes. If a signal is steady it has to be pretty weak to be too weak to copy. A shifting signal has to be strong and very broad to be copied without trouble.

Every good operator knows his exact wavelength. He uses his wavemeter with both the receiver and transmitter. Unless the wavelength is known, operation becomes a haphazard, purposeless procedure. There is no reason for *not* knowing our wavelength exactly. WWV is giving us standard frequency signals at frequent intervals; NKF transmits on twenty and forty meters, generally telling the world what wavelength he is using, and *QST* prints a list of OWLS', some of whom you can hear at any time.

When the wavelength is known, a good

wavemeter made and calibrated, operation by schedule becomes easy, long calls become unnecessary and results are far more satisfactory.

Most good operators handle traffic. Traffic handling tends to make better operators of

GET OUT OF THE WAY!

us, and our stations should be used with that end in view.

We should provide ourselves with message blanks and log sheets (homemade ones if we cannot afford the printed ones), and we should study the operating rules, a copy of which the traffic department of the A.R.R.L. will furnish anyone at any time. Then we should solicit traffic from our neighbors and friends and make traffic handling a definite part of our activities. We should keep in touch with our traffic officers, D.S. or C.M., and keep posted on special tests which are sponsored by the A.R.R.L. When they are pulled off we should either help or stand by and not gum up the tests because of our ignorance of them.

Good operators are considerate of others when on the air, they are patient with beginners, and in the majority of cases they are ready to assist in Club actvities and to answer letters. The "bigger" a man is the broader his viewpoint and the more willing he is to help others with their operating problems.

Every American amateur should:

1. Join the A.R.R.L.
2. Study *QST* and the Operating Rules.
3. Keep a log.
4. Handle some traffic.
5. Take part in tests.
6. Be considerate of the BCL.
7. Help out with Club work.
8. Send an account of his experiences to *QST* occasionally.
9. Always be ready to help the other fellow.

THE Traffic Department is that department of the League's activities concerned with the practical operation of the stations of its members. The several purposes of the Traffic Department include:

Arranging amateur operating activities.
Establishing standard operating procedure.
Encouraging good operating.
Improving message relaying.
Conducting tests.

The work of the Traffic Department has definite objectives. The aim of the Traffic Department is to bring into existence:

A large and efficient communication network made entirely of privately owned radio stations.

A body of skilled operators whose services and abilities we may use to further the general knowledge of the art of radio communication, to relay friendly messages to different parts of the country without charge, and to help our country in time of any sort of an emergency.

These objects of our organization must be borne in mind at the same time we, as individuals, are getting the most enjoyment from the pursuit of our chosen hobby. Only by operating our stations with some useful end in view can we improve the service which we give others and increase the pleasure we get from amateur radio communication.

The policies of the Traffic Department are those which urge members to use system in the operation of their stations. Compliance with government regulations, adoption of orderly and efficient operating procedure, and cooperation between members and between the League and outside interests for the advancement of the art, are all embodied in the policies of the Traffic Department.

The activities of the Traffic Department are arranged and recorded through the official organ of the League, *QST*, and by special correspondence. Tests and relays are arranged from time to time to develop new routes for traffic handling and to increase the general knowledge of short wave radio communication. In this way the whole membership can learn the possibilities of communication on different wavelengths and all members can benefit from the experience of certain members of the League.

It is obviously impossible to distribute up to the minute information in a monthly periodical. Therefore, circular letters are used to keep the active stations informed of the latest developments in such a rapidly progessing system. Official Broadcasting stations have been appointed to better even this arrangement. Official Wavelength stations have been selected to aid in maintaining the orderly and law-abiding operation which is in accordance with the policies of the League and of the Traffic Department.

The Questionnaires

Some time ago each Official Relay Station was sent a questionnaire asking for information on the following subjects:

Yourself
QST
Amateur Practise
Cooperation
Traffic Department Activities
Official Broadcasting Stations
Traffic Department Reports
Station Operation
Station Apparatus
General

Each station owner was asked to show his loyalty and his activity by answering the questions and by thinking a bit about his responsibility to himself and to others in the operation of his station.

The response was prompt and generous. Not only did the immediate return of hundreds of questionnaires with compete information show intense interest in the Traffic Department, but also the indications of loyalty and support helped every member of the Traffic Department staff to do a little bigger and better day's work than before.

The questionnaire answers show us just where we have fallen down. In August and September *QST* we will be able to tell you some of the things we have failed to tell you in the past. We will answer some of the questions you found difficult, we will tell you how your Division compares with other divisions, and we will try to improve certain conditions that show need of improvement.

There are two reasons why we cannot print the answers to the questionnaires this month. Questionnaires are still returning and we hope they will keep on coming back until the middle of July. We do not want to begin to tell you about the questionnaires until they have all come back to Hartford with your honest opinions on some of the matters that concern the Traffic Department. Routine work keeps us from spending the necessary time to finish reading and recording questionnaire answers in detail before July *QST* goes to the printer.

In another part of this issue of *QST* you will find mention of "WNP" and "NRRL." Please listen for their signals on the forty and twenty meter wavelengths. Whenever possible get in communication with them and report hearing or working them to Traffic Department, 1711 Park St., Hartford, Conn. Reports of contact with these expeditions will be of real value if you include complete details. We will follow the progress of each from month to month in this magazine. Your co-operation is asked and expected.

Official Broadcasting Stations

The League maintains a broadcasting service which is being continually revised and improved. Below are listed the present active stations and their wavelengths. Each Saturday and Sunday night at 7.30 and 10.30 P. M. local standard time the latest available information of interest to amateurs and League members is broadcast. Every station has pledged himself to send on schedule. The wavelengths are listed so that you will know just where to listen for them. These stations are willingly giving their time to this work. They will appreciate it if you will listen and drop them a postal card saying you copied the Official Broadcast Message from them.

Station	Wavelength 7.30 p.m. (E.S.T., C.S.T., M.S.T., P.S.T.)	10.30 p.m. (E.S.T., C.S.T., M.S.T., P.S.T.)
c1DD	42	120
c2GG	*42	42
c3AFP	40	40
c3NI	39.9	85
c5CT	81.5	120
BER	44	44
1BCR	39	39
1CKP	41	41
1EF	78	78
1GL	80	190
2CQZ	—	185
2WR	20	40
2ZA	82	82
3LL	39.5	39.5
4FM	—	85
4MM	80	—
4XE-IU	76	76
5ACZ	38	38
5OX	38	—
5AGN	40 and 80	40 and 80
2AQR	78.5	78.5
5AJP	80	80
6BUR	40	40
7BJ	76	76
8ASE	79	79
8BNH	85	85
8BSU	78	78
8ZH-AND	76	76
9AGL	80	40
9AHQ	42	42
9BKR	41	41
9BMR	71.5	71.5
9BMX	42.6	42.6
9CAA	40	150
9CFI	40	40
9CJS	—	185
9DBZ	42	—
9DXY	40	40
9EGU	37.5	37.5
9XI	40	40

* 6.30 p.m. E.S.T.

Another cry for Traffic Articles is necessary. This section of *QST* is bigger than ever. We want to also make it better than ever. With your assistance we can do this. Without your assistance we can do nothing. Don't use a typewriter if you can do better without it. We want you to criticize the present conditions and suggest something to better those conditions. New ideas and new viewpoints are what we need, what we must have. Articles are judged on merit alone; handwriting doesn't count. You can do as well as the next fellow. Prove it by sitting down and writing us. Get those ideas on paper before they escape.

Traffic Briefs

Did you ever notice that GOOD traffic always gets through? See that you originate only that kind.

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There is no excuse for reporting that there was no traffic to handle. That in itself is an indication that someone is asleep. It is easy to put a little sign on the outside of the station saying that messages are welcome and will be transmitted free of charge to all parts of the country. It is the duty of every Official Relay Station owner to originate his share of traffic and to handle traffic in such a manner that public confidence in our service grows.

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Official Relay Stations are instructed to refuse to take messages bearing no serial number and office of origin. This ruling goes into effect at once. Next month we shall print some further matter on improving the message handling situation. See that every message *you* originate is in the proper form containing complete information so that a "service" message can be sent if the station at the destination cannot deliver. DO YOUR PART IN IMPROVING RELAYING.

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The Florida Station Conduct Contest has resulted in making Florida a leader in good operating, good traffic handling, and courteous procedure. Ask your A.D.M. what steps are being taken in your territory to make conditions better.

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The Pacific Division Manager is issuing a "Certificate of Merit" to the stations handling most messages consistently. Three months of good work are necessary to obtain recognition. All messages must be handled in approved fashion.

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The Trans-Canada weekly relay using the 120 meter wavelength on Wednesday nights has proved to be a success. As soon as the questionnaires have all been received we expect to pick some stations equipped for work on certain wavelengths and to establish some regular routes where they are most needed to handle traffic.

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The Providence Radio Association has offered a cup for the best traffic-handling station. Every message that counts must be handled in strict accordance with League practise. Messages started by the operator count one point; messages started from the station count two points; messages accepted and relayed in transit count three points; messages accepted in transit and delivered in person count five points.

During the Automotive Equipment Exhibit and Convention in Detroit, May 18-23, all of the communication between five delegates and the New York office of the Automotive Merchandising and Automotive Wholesaling was handled on 41 meters on regular schedules at 8 A.M. and 11 P.M. daily by 8CWK and 2WC. Not only was the regular correspondence efficiently handled but most of the Convention Report was sent to New York by radio for publication in Automotive Wholesaling.

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9AVJ originated his share of good traffic by taking a portable transmitter along on a trip he made with a baseball team.

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2BGI recently handled several messages for the Los Angeles when the short wave transmitter at Lakehurst was temporarily out of commission.

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4KU and 4AU conducted a radio school in Atlanta, Ga., for the benefit of the coming generation of amateurs in that vicinity. A good-sized class attended the school and after several months' labor a number of new amateur stations with *good* operators are operating in Atlanta. Another school will start soon and the same results are expected.

Changed Reporting Practise

All individual operators handling more than 100 messages each month must send them to their Division Manager for checking. The Division Manager is expected to indicate that messages have been properly received and checked by putting his initials on the report that is sent to Headquarters immediately after the call of the station who has done the good work. Messages that count must be handled in accord with League practise. They shall be numbered correctly and they shall be handled within forty-eight hours as indicated by the time and date written on each message. No "rubber stamp" messages shall count.

All monthly traffic reports shall state:

1. The number of messages *originated.*
2. The number of messages *delivered.*
3. The number of messages *relayed.* (Messages received by radio and forwarded within 48 hours by radio).
4. The total number of messages handled. (The sum of "1", "2", and "3").

The changed practise should make every report mean more and the awarding of the Traffic Department Trophy will be fairly made only when all messages are checked by the Division managers.

Vigilance Committees

All Vigilance Committees are requested to report monthly to the Assistant Division

Manager of their state. Their report should give information on the local publicity given their work during the month, on the number of complaints received, the number of complaints investigated, and the action taken to remedy the interference situation. Mimeographed blanks for entering complaints of broadcast listeners and for reporting investigated cases of interference to Headquarters may be obtained directly from the Traffic Department on request by the chairman of the local Vigilance Committee.

The first thing that you will notice this month on opening to the Traffic Department section is that there are no stars around the calls of the men handling most traffic. The reason for the omission is that the reporting practise was changed a short while ago. Because some divisions conformed to the changed practise while other divisions did not heed it there was confusion. Only part of the men handling heavy traffic remembered to send their messages to the Division Manager for checking. In fairness to everyone we have written the interested stations and their Division Managers and next month we will give stations deserving real credit due mention. Please note that every report worth *special* mention in *QST* must be checked. No more inflated message totals can appear.

Correction

The cut of "The Five Point System" was accidentally omitted last month. Until regular relay routes can be laid out we urge that you arrange some schedules with your neighboring stations as suggested by Paul Fenner last month. Please study the dia-

gram and re-read the article in last month's Traffic Department section of *QST*. Remember that schedules will improve the message handling situation. Schedules must be faithfully kept to be successful.

We recommend to your attention the several excellent mimeographed newspapers we have received this month.

Ham Garden is published by the Old Timers' Radio Club of South Bend, Ind.

Radio Wave is the official publication of the New Orleans Radio Association.

Key Klicks published by 7QP covers the entire seventh district.

Badger A.R.R.L. News is edited by 9VD, the A.D.M. of Wisconsin.

Northern Texas A.R.R.L. News is printed by 5AJT, the A.D.M. of Texas.

The *Monthly Service Bulletin* is written by "Ted" Duvall and covers the entire Atlantic Division.

SOUTHEASTERN DIVISION

H. L. Reid, Mgr.

FLORIDA—Five of the Florida hams went on the Naval Reserve cruise. More of them have enrolled and this cuts our report this month.

The A.D.M. *wishes to take issue* right here *with those who claim that traffic is scarce.* With a low powered transmitter, comparatively weak signals and very little operating time, he had 57 messages literally shoved upon him.

The Florida fellows, with very few exceptions, are taking the better operating drive seriously and are joining forces with the A.D.M. to enforce 100% observance of the League's operating rules. All O.R.S. are hereby notified that failure to comply with these rules will result in their appointments being cancelled.

The Vigilance Committee at Miami is kept busy. Other cities formed committees but received no complaints to work on.

Central and Southern Florida remain the center of traffic handling and general activities. 4DM was the first station in this division to work NRRL; he also worked seven foreign countries and was copied in four others. His twenty meter signals were copied in London at noon. He frequently works NKF with a plate input of 1.35 watts and at noon. This work was all done using a "B" battery source of plate power. His schedules with various Florida and northern stations make him the high traffic handling man. 4FM, 4VS, and 4CH are the "big three" in Miami. 4QY keeps in touch with Miami and Cuba by radio.

4XE worked Australia and Honolulu using a forty meter wavelength. 4TR is a good traffic man. He maintains excellent Cuban contact. 4JY, 4TV, and 4IZ are working on twenty and eighty meters. 4PB and 4UA are fairly active.

Jacksonville and St. Augustine hams have a mania for rebuilding. 4PI and 4FS have just returned. 4DU, 4UK, and 4FS all work each other on five meters when they feel like it. 4DU and 4UK do good work on other bands also. 4UX has abandoned eighty for forty meters. 4KK and 4EZ are still working on eighty meters. They keep schedules with 4DM and others. 4PK is busy selling Florida real estate.

Traffic: 4DM, 131. 4VS, 75; 4EZ, 57; 4FM, 54; 4QY, 37; 4CH, 28; 4TR, 25; 4KK, 21; 4NE, 15; 4TV, 14; 4XE, 10; 4PK, 8; 4JY, 8; 4PB, 2. 4IG, 2; 4PI, 1.

SOUTH CAROLINA—4DX worked New Zealand and England recently when 4DX was home from school for a few days. 4SH handled ten messages in two days under similar operating conditions. Eighty meter work is very attractive to 4HW and 4IT. 4RR-4VL has dropped his wavelength to twenty and forty meters. He is remodeling his set while awaiting a fifty watter. 4SL is away at school in Mississippi. He is operating 5AEG and 5GP.

Traffic: 4SH, 10; 4IT, 24; 4HW, 20; 4RR, 8.

GEORGIA—Morris, A.D.M., was still in Europe at the time of writing this report. From all accounts he is having the time of his life. He has been the guest of clubs and prominent amateurs and has had the pleasure of working his own countrymen from

several of the English stations. Georgia is proud of 4IO!

Quite a few Georgian stations are on the lower wavelength bands, finding this the best way to combat the summer static. 4RM worked NRRL while the latter was far out in the Pacific. 4DT has finally changed to eighty meters and is doing good "DX". 4JD is now on forty meters. 4BW, 4BK, and 4WX are heard frequently on forty meters. 4WN works "sixes" with a single "201".

Get back on the air, fellows, and let's go! Static doesn't bother on forty meters. Let's put Georgia back where she belongs. Florida is setting us a fine example.

Traffic: 4KL, 26; 4JD, 16. 4FZ, 10; 4AAH, 12; 4KU, 9; 4WN, 20; 4WX, 8; 4AU, 8.

ALABAMA—5AMH of Birmingham leads the state this month in traffic handling. 5XA who comes next, is considered one of the most powerful stations in this section of the country. Her signals are heard all over the world. Dist. No. 1 is doing splendid work. Dist. No. 2 is increasing in activity. Dist. No. 3 is dong good traffic work. Dist. No. 4 is lax this month on account of school activities.

Dist. No. 1: Supt. Connolly made his report from a sick bed this month. 5AMH is doing good work with a lone "fiver". 5VV's activities were lessened by school "QRM". 5ADS is resting on his laurels after winning the Birmingham Radio Club Cup. 5WS is recuperatng. 5ZAS and 5MI are both to be complimented on their good work on the extremely short waves. 5ARI is meeting with phenomenal success on forty meters. 5ARJ is a regular traffic handler and rates as an old timer. 5AEF is a little lax this month. 5EQ is heard frequently.

Dist. No. 2: A great deal of credit is to be given to Supt. Rush of 5QF and to C. M. Hurley of Mobile for activity in this district. 5QK reports some fine reception of NRRL. 5AOM got married. Bring the "OW" back into the game, OM. The second operator at 5QK is on the air under his own call, 5FD. 5AC is blasting holes in the ether with two "fifties". 5QF and 5AAD are doing good work on forty and twenty meters. Rush states that he expects a great many more operators after the Supervisor makes a visit to Mobile.

Dist. No. 3: 5WI of Dotham is on the air regularly.

Dist. No. 4: 5XA handled a lot of traffic this month in spite of heavy school work. Their "bunch" of good operators tells the story.

Traffic. 5AC, 44; 5AEF, 3; 5ADA, 35; 5AHK, 15; 5AJP, 35; 5AMH, 190. 5ARI, 6; 5ARJ, 31; 5ATP, 65; 5DI, 67; 5NL, 5; 5QK, 20; 5VV, 27; 5XA, 125.

WEST GULF DIVISION

F. M. Corlett, Mgr.

DID you fellows of the West Gulf see that challenge from Florida? Are we going to let them get away with it? Look on pages 4 and 5 of May *QST* and see what the argument is about and then set about to give Florida some competition!!

A number of O.R.S. applications are pending action. First one thing and then another delays the issuing of these certificates as promptly as you fellows would like. First, we try to be sure that you really deserve the honor and it takes time to get each Traffic Official's approval; then some one at Hartford has decided that we D.M.'s only need an up-to-date list of our division members every six months and between times we have to ask Hartford if O.R.S. applicants are members in good standing. This takes time and additional work. However, your Headquarters men are doing the best that they can do with what they have to do it with, so—please be patient. Thanks.

The situation in general has been disappointing in some respects in this section. The A.D.M. wishes to call the attention of all of you to the fact that every O.R.S. receives a self-addressed traffic report card each month. All that remains for you to do is to put in the traffic figures, and mail the card, but apparently this is too much work for some of you. If for any reason you cannot fulfill the simple requirements of an O.R.S. let me know. We would like to save the one cent stamp on the post card, to say the least. *Everybody* should get his report to the A.D.M. not later than the 22nd of the month.

Franklin, the Houston D.M. has worked all over the U.S. in the daytime on a wavelength of 19 meters. He worked a Japanese station and a ship at Hong Kong, China, as well as NRRL. 5OX turned in a nice message total. 5APM is getting out well in spite of the terrific QRN. He is "QSO" Mexico. 5MS, reports traffic moving well through that town.

Traffic. 5MS, 44; 5EW, 26. 5HC, 5; 5HS, 7; 5ACZ, 25; 5OX, 27; 5APM, 18; 5EI, 24; 5AHM, 7; 5ZF, 10.

OKLAHOMA—An indication of progress in Oklahoma is the way the fellows are lining up with our organization. New reports are received each month. However, the A.D.M. receives a number of reports each month that arrive too late (after the 24th) to get in the official report for Oklahoma.

5HH-5AAH worked and handled traffic with NKF, VDM, and NRRL. Both 5ADO and 5ANL are in line for O.R.S. appointments. 5AGN is on eighty meters with a new 23-A working all districts; he was also heard in Australia. 5ASW sent in copies of the messages handled by him and he deserves credit for the neat appearance of his report. 5AAV had hard work getting his receiver to work on forty meters but as a reward he heard NRRL. 5ABO is using a "fifty" with a Delco plate battery supply for phone and C.W. work. 5GJ turned in a good traffic report. The "YL" operator at 5ALU and 5ACD is "OK". She has a good "fist". When the fellows find this out it ought to help 5ALU-5ACD's message total. 5APG is working on forty meters with indifferent success. 5ATV burned up two "fivers" and is operating with a "fifty" now. 5ATK lost a five-watt tube but is still on the air. 5AIU-5ZAV will soon be operating on five, twenty and forty meter wavelength bands.

Traffic: 5APG, 12; 5GJ, 47; 5AGN, 5. 5ASW, 14; 5AAV, 15; 5ABO, 21; 5ALU, 23; 5ABE, 8; 5ANL, 10; 5ADO, 5; 5APZ, 7; 5AAH, 3. 5ATV, 5; 5ATK, 16.

NORTHERN TEXAS—No. 1: 5DW is busy with business. 5JH is putting in a new vertical cage; he expects to work on an eighty meter wavelength this summer. 5NW, on forty meters, was reported in England with an audibility of R8. He has a first-class commercial license and is ready to take a job on anybody's private yacht. Hi! 5NY is still trying to get a forty meter receiver to "perk". 5AMB as a result of some "QRM" from the "OW" had to move his station from the kitchen and build a separate shack for it. He likes the new arrangement very much better and only wishes that she'd run him out long ago. This shack, by the way, has accommodations for "hams" who wish to stay overnight at 5AMB. 5LI has been busy with office work. 5AKX and 5ADD are about through with school work now and will soon have their stations back on the air.

Dist. No. 2: 5QY likes the forty meter band quite well and has worked with g2GG. 5ALJ was busy with school exams and the class play. 5ATH likes forty meters and is going down to twenty for next month's testing. He is working on regular schedule with 9CUO and would like some schedules east and west of Center, Texas. 5AMG will be heard regularly after school is out.

Dist. No. 3. 5UO has rebuilt his set. 5AMZ has a seventy-five and forty meter transmitter ready to go, but no receiver.

Dist. No. 4: 5AJH announces that many New Zealand and Australian stations are working on thirty-seven meters and that j1AA is FB on forty-one meters. 5AJH's best "DX" "QSO" is with NRRL while the latter was at Hawaii. 5OQ will have two transmitters, one on 75-85 meters and the other on forty. Both sets will use a single UV203A.

Dist. No. 5: 5ZH is building a new type antenna for short waves. 5VD is rebuilding his set to work on twenty, forty, and eighty meter wavelengths. 5AKF blew his "50" and is planning on a "250" and an assistant operator next fall and winter. 5AIJ is ready for tests on twenty and forty meters and traffic on forty and eighty meters.

Traffic: 5JH, 4; 5NW, 1; 5AMB, 2; 5LI, 8. 5ADD, 4; 5AQL, 6; 5QY, 7; 5ATH, 3; 5AJH, 7; 5NY, 1; 5OQ, 13. 5AIJ, 3; 5AJJ, 22; 5HY, 25; 5ACL, 21; 5VF, 31; 5OT, 8; 5MZ, 7; 5AKQ, 8; 5AQC, 5; 5AKZ, 15; 5AFU, 8.

NEW MEXICO—Fellows in New Mexico should report direct to the D.M. until further notice. 5LG-5SC, during seven days at home, handled eight relays and one delivery message. He is installing a "fifty". He also announces he will try some ¾ meter transmitting and receiving and wants to hear from anyone else interested.

ATLANTIC DIVISION
E. B. Duvall, Mgr.

THE recent requests for information concerning the status of O.R.S. in this Division has proved that but fifty percent of the stations on the records of the Division Manager are active.

These requests brought many complaints and suggestions concerning conditions throughout the Division that were in some cases unknown to the D.M. These were appreciated and will receive attention, with the main objective to improve. The main and important thing to do this summer will be to make every effort to report, and report on time. No matter how small the reports may be, they will show progress, and before the fall undoubtedly many changes for the betterment of the whole Division will be in order.

The D.M. acknowledges with gratitude the fine spirit of those who have shown their willingness and cooperation.

MARYLAND—3RF and 3GT are new converts to the efficiency of the shorter wavelengths. 3TE-3XAQ just built a portable super-het receiver to take away with him this summer. 3SF is rebuilding. 'Can't these fellows stay put?—D.M.) 3PH, 3AAM, 3QI, and 3MF are using a 160 meter wavelength. 3LL, using a forty meter wavelength, worked the West Coast. 3OU, using a forty meter wavelength at Tome School, Port Deposit, Md., has worked Australia and the West Coast. (FB, Bailey, OM!—D.M.) 3BUR is heard in Europe, but rarely operates due to Naval Academy studies. 3PA turns in a fine report. 3APV at Chevy Chase worked NRRL! Excellent! 3DW is on 82 and 42 meters. He has schedules and tests with 8CEO, 3HG and 3ZO. Schedules are still open for traffic officials and tests are invited.

Traffic: 3ZD, 86; 3CGC, 46; 3PA, 21; 3LG, 12; 3BUR, 3; 3LL, 1; 3HG, 11; 3APV, 25; 3DW, 17.

DISTRICT OF COLUMBIA—Most of the stations with the exception of two or three seem to be inactive. As usual, 3BWT seems to be the most active and persistent station in the district. He has three transmitters and a flock of operators. They work on 188, 77, and 42 meters. Operating hours during the summer will be 6 to 8 p.m. 3BPP uses all allowable wavelengths from 20 to 170 meters. He reports excellent but inconsistent results with his twenty meter set. 3HS has been on 20 meters, likes it and claims to use it exclusively. 3LR came on with a bang. He has now joined a jazz band. 3AV is on the job from 6 to 8 p.m. on eighty and forty meters. 3CDQ is sporting a new "rain-spout" antenna and rebuilding his receiver.

Traffic: 3BWT, 34; 3AB, 22; 3BPP, 13; 3JO, 2.

NEW JERSEY—The recent visit of the Radio Supervisor to Trenton awakened interest and traffic has taken a decided jump. 3XM-3DH had the "XM" cancelled. 3XAN and 3ZI, both on 40 meters, carry off the honors this month by working in daylight with Cuba and Porto Rico: 3CBX has gone back to 150 meters. 3BTQ buried another 50 watter and is now "perking" with a lone "fiver". 3SJ has been heard in England and France. 3XAN handled considerable traffic for the dirigible Los Angeles on her recent trip over this section.

3BWJ is doing trans-ocean work on tweny meter wavelengths. Definite dates have been set for the Third District Convention to be held at Atlantic City the latter part of September.
trans-ocean work on twenty meter wavelengths. Definite dates have been set for the Third District Convention to be held at Atlantic City the latter part of September.

Traffic: 3XAN, 30; 3ZI, 4; 3CBX, 8; 3BTQ, 15; 3XM-3DH, 9; 3SJ, 8; 3BRM, 5; 3RE, 1; 3OQ, 3; 3AIH, 10; 3ALX, 4; 3BAY, 1; 3BEI, 12; 3BWJ, 21; 3WB, 11.

EASTERN PENNA.—The shorter wavelengths are best for handling traffic this summer. 3QN, the D.S., is going to dig up the "dead" ones with the old "rock crusher". (It may take dynamite—D.M.) 3ADP is using a forty meter wavelength. 3BNU is working consistently on both 40 and 84 meters. He has one "fifty" in service. 8AVL is heard on 20 and 40 meters. 8AOL is installing some phone sets on an airplane. 8BDN, 3LK and 3AVM are traffic handlers.

Traffic: 3BAU, 5; 3BNU, 46; 8AVL, 23; 3AVM, 2; 3BLP, 131; 3CDV, 2; 3BLC, 9; 3CJN, 18; 3MQ, 10; 3TP, 17; 3UE, 7; 8BPN, 5; 3AUV, 26; 3QT, 29; 3ZO, 88; 8EU, 3; 8CCQ, 1; 8WH, 4; 8BFE, 12; 8CFT, 6; 8BQ, 11; 3HD, 17; 3FS, 5; 3BVZ, 19; 3LW, 13; 3BCT, 30.

At the last moment we heard that 3GK worked WJS of South America for two and one-half hours taking eight messages. WJS reports he is headed for home.

WESTERN NEW YORK—Stations in this section are handling traffic in great shape. Many have taken the advantage of the enlistment opportunities offered by the Naval Reserve where they can get the experience of using the big sets for handling regular government and commercial message traffic. To those who have not signed up we say, "INVESTIGATE."

Miller reports three stations doing fine work on 80 and 40 meters, handling traffic and reporting regularly. 8ADG, C.M. of Utica, is using 20, 40, and 80 meter wavelengths. 8BZU, C.M. of Rome, reports that 8CUO, 8BRI, 8BEC, and 8CNY are about done with their school season and that they are preparing their stations for short wave operation. 8AOZ, 8DHN, and 8BSP are using the shorter wavelengths. 8BCW uses a wavelength of 77 meters, and a "250". 8BZU, using a 203A tube, was heard in England. 8CCR worked fine "DX". He operates regularly on 19.4, 41.4, and 75 meters. 8AAD is now 8BMN using a 203A on forty meters. 8ACM is off due to the press of Laboratory work. 8DME works on 40 meters. 8ZU is doing fine work on 43 meters with schedules east and west for traffic handling.

8HJ in Dist. No. 13 is doing good traffic work. 8VW still handles traffic on a 200 meter wavelength. 8NB is going to move to California this fall. He reports that 8BAJ and 8CYI are working on forty meters, the latter station worked every district. 8ALY worked New Zealand, Samoa, France, England, Holland, Spain, and Italy. 8KS worked NRRL and also g2CO. 8BHM worked every district. 8PK and 8BJW are both doing good work. 8BSF reports much traffic for his dietrict.

Traffic: 8AVD, 6; 8AVJ, 3; 8ADG, 3; 8ADE, 15; 8AWH, 26; 8AIN, 12; 8AXH, 20; 8AXN, 5; 8AGW, 20; 8BOE, 21; 8BSF, 35; 8BHM, 8; 8BAJ, 19; 8BRB, 20; 8BXP, 6; 8BZU, 4; 8BCW, 2; 8CNX, 61; 8CYI, 152; 8CFV, 7; 8CCR, 41; 8DRJ, 45; 8DDV, 5; 8DSM, 12; 8DKE, 23; 8DFK, 22; 8DME, 12; 8DGA, 3; 8NB, 43; 8NT, 30; 8RV, 8; 8BQ, 14; 8UF, 27; 8VW, 12; 8ZU, 171.

WESTERN PENNA.—Starting this month the A.D.M. promises faithfully to send to the D.M. all reports received previous to the evening of the twentieth of each month. Reports received after this date will NOT be given attention. Prompt reports will insure representation in *QST* and this, in time, will inspire other stations to seek appointments and to report their activities. The A.D.M.'s new QRA is 6044 Hoeveler St., Pittsburgh, Pa.

(Wiggin promises his cooperation, fellows, so give him your support—D.M.)

Dist. No. 9: The use of the short wavelengths is becoming popular. 8BJT is experimenting. 8BW has lost some tubes, but is still going strong. 8UT and 8CIX report traffic slack. 8QD is still doing business. 8CKM has a new rectifier. Using 26 watts, he handled a 53 word message and was heard in California. 8DNF worked seven districts on an inside antenna. 8CES is an active station in the New Kensington district. 8CEO maintains a schedule with 4JR, but traffic is light. Tests are in progress with 4JR and 3DW to determine the areas which can be worked and which are "dead" to forty meters in daylight. 8DOQ worked a "seven" with 350 volts

on a "fiver". 8BRS is experimenting with the short wavelengths and building a five meter receiving set.

Pittsburg: Few reports were received this month, due to the inactivity of hams since the convention. The C.M. promises to devote his efforts toward bringing about a "hamfest" for the near future. 8JQ is active and can always be depended upon for a report. Lot's brother is back from doing commercial work. There are now two good "ops" at 8JQ. 8BHJ has been heard in England. 8PX and 8AKJ are working on their combination station. 8AGO is still busy doing P.R.S. work. He has been off the past month rebuilding his equipment so that it covers all waves. "Mack" Sinnett at 8BCM uses one "fiver" on forty meters. 8AEY is temporarily off, as he has "blown" his fifty watter. 8DIZ has moved to California. 8BDG is overhauling his station. 8BUY is operating again with a "fiver". 8CTF has been keeping up interest by working other stations of the Atlantic Division.

Dist. No. 10: 8CCK is active. 8AUD has just moved. 8ADS says he is too busy to operate right now. 8BYI has been building a new broadcasting station, WHBP.

Dist. No. 11: 8DKI reported direct to the A.D.M., having handled 15 messages. 8BJV is getting discouraged. (Try to stick it out this summer, OM; things will be humming again by next winter.)

Traffic: 8BJT, 9; 8BW, 3; 8UT, 6; 8QD, 22; 8CKM, 5; 8DNF, 4; 8CES, 2; 8CEO, 3; 8JQ, 107; 8BHJ, 6; 8CCK, 9; 8DKI, 15.

DELAWARE—Layton failed to report for the first time since his appointment. He is probably sick. His report is missed and we shall look forward to a good thick one next month.

CENTRAL DIVISION
R. H. G. Mathews, Mgr.

KENTUCKY—9HP has been most active this month. 9DTT was second. 9HP was heard in France and New Zealand. 9ELL-9MN is working on forty and twenty meters, but the report shows messages handled. A new WE 250 watter has been installed. 9CON reported by radio this month. 9DWZ worked f8QQ. 9ALM is doing good work on the 150-200 meter wavelengths band. 9APS is operating two "fivers" on eighty meters. 9BPB worked several west coast stations. He has vivid visions of a new set.

F. L. Brown of old 8BKE will be operating at Weeksbury, Ky., soon.

Traffic: 9HP, 22; 9DTT, 18; 9WU, 16; 9ALM, 11; 9CON, 11; 9ELL, 8; 9MN, 8; 9OX, 8; 9OWZ, 5.

OHIO—Dist. No. 1: 9ECB was heard in Japan and Italy. 8BN and 8BSA handled a lot of messages on account of the Radio Show at Toledo. 8BO has sold his outfit. He is going to California. The D.S. is looking for a good man to fill his position.

Dist. No. 2: 8BBM handled most of the traffic this month. 8ZE continued to work the west coast every time he operated his station. He was in touch with every inspection district but the sixth and seventh within an hour of noon on 41.7 meter wavelength. He worked NRRL. 8RY worked g5LS. He was heard by eAR6, f8BV, and g2ZB. 8DBM transmitted on 85.4, 42.5, and 20.8 meters. Most of his work was on 85 meter wavelength. 8BCE is using forty and eighty meter wavelengths at present. 8BCE worked "LR" in Brazil.

Dist. No. 3: A great number of the boys are operating on forty meters wavelength and the rest are on eighty meter. 8BWF uses a twenty meter wavelength. 8ACY, 8BWB, and 8BKM are operating on the Great Lakes, but 8BWB is coming back home and have a real station on the air. Several stations have logged NRRL. 8DAE worked France using a forty meter wavelength. 8ADA is graduating. Radio had to take a back seat for the month.

Dist. No. 5: 8GZ is still the star station for this district. He turns in a fine message total every month. The rest of the fellows should pattern their own work accordingly. 8PI operated just a bit on forty meters. 8EI is a new O.R.S. Windom operated this station a little while. 8CBP handled just a few messages. 8GZ, 8BAU, 8DO, and 8BYN have been arising early and working Australian, New Zealand, and Hawaiian stations. 8BYN has been working overtime at the shop. He could not be on a darn hard try after the overtime work is done. The summer work is progressing nicely. The D.S. hopes that the "gang" will handle more traffic and qualify for the rag-chewer's club. (Let's hear from some of you trying a McCaa Band Selector. I expect to have mine built soon.—D.S.)

Traffic: 8GZ, 462; 8BYN, 320; 8BN, 87; 8BSA, 58; 8BAU, 42; 8BTH, 40; 8DBM, 38; 8DAE, 37; 8DPN, 17; 8BWB, 35; 8DO, 27; 8PL, 25; 9BQI, 24; 8EQ, 17; 8ZE, 17; 8CBP, 16; 8DND, 12; 8DRX, 12; 8AOE, 10; 8EI, 9; 8DMX, 4; 8AA, 3; 8RY, 3; 8ARO, 1; 8BKM, 1.

WISCONSIN—Dist. No. 1: 9DTK has been experimenting with forty meter transmission. His partner got married and traffic handling temporarily suffered as a result. 9DB worked z2XA from 5 to 5:25 a.m. Sunday, May tenth. 9BBY heard NRRL regularly.

Dist. No. 3: 9DKS is busy rebuilding both his amateur and broadcasting, WLBL. He reads the bulletins from the publicity department in front of the microphone at WLBL. 9DKA sent in a good message report. 9DCT worked N.Z. 9ADT lost his mast. 9EMD operates daily using a 180 meter wavelength. 9AEU was on the air only one week of the past month. 9CIU has been so busy with school work that he has not touched the key for a month. 9BVA has not been on much sinie the sleet storm put his antenna out of business.

Dist. No. 4: 9BFI is doing good work. He handled some real messages, maintaining schedules with Minneapolis in the early morning hours and putting himself in the Brass Pounders' League. Although he is a minister's son, bottles of various caliber adorn the extremities of his counterpoise and antenna, much to the wonderment of the neighbors. 9BFI worked New Zealand from Minneapolis. He is a fair competitor of 9DTK. 9DCX was away part of the month. He is moving his set to a new shack for the summer.

Dist. No. 5. 9BKU is busy at work. 9EL is operating on 20, 40, and eighty meters almost every afternoon and evening. He now has a commercial operator's license. 9BTH is busy at WEBC. 9DPR operates on forty meters. He is the new District Superintendent.

Traffic: 9BFI, 305; 9DTK, 135; 9DCX, 61; 9ALN, 50; 9DKS, 38; 9DB, 34; 9DKA, 34; 9ELI, 33; 9ABZ, 30; 9EIL, 26. 9ATO, 24; 9BSO, 22; 9BKR, 20; 9EHM, 18; 9AKY, 15; 9DCT, 14; 9EMD, 14; 9DPR, 10; 9AEU, 9; 9NY, 9; 9AQD, 8. 9AFZ, 7; 9CVI, 6; 9DTK, 4; 9CRA, 4; 9AEE, 4; 9CII, 3; 9BMV, 3; 9BKU, 3. 9PJ, 3; 9CVG, 3; 9CJV, 2; 9ATB, 1.

INDIANA—Dist. No. 1: 9BYI operates regularly every morning, using the 80 and 160 meter wavelength bands. 9DRS is using a single wire antenna with good success. 9AUC got through to England with his "fiver" 9EJU has a fine message report. 9EG says traffic handling is good on the 75-85 meter wavelength band. 9CXG handled traffic, but not at all consistently. 9BKJ says there is nothing to report worth mentioning that has not already gotten into the papers at Fort Wayne. 9CLN is taking his yearly vacation. 9AZX has a better location for old 9AZX in mind.

Dist. No. 2: 9BYL, the new O.R.S., sends his thanks for the appointment. 9MM operates on a forty-two meter wavelength. 9XI worked several distant stations with one "fiver". 9CBS is rebuilding. 9BYG is coming back soon. 9EFZ operates on twenty, forty, and eighty meters. 9DHJ passed the commercial examination. 9BPT says his "YL" just returned from Florida. 9BBJ says that the Old Timers Club meets weekly. 9OG worked Spain. 9DKT, the best technical man in the city, is the only one on forty meters. He is a Western Union "op", and there is a rumor that he tries to work amateurs in Morse occasionally but is not very successful. 9CUB is an operator at WGAZ. 9BO is the chief operator at WGAZ. 9DLZ worked all U.S. inspection districts on two "fivers". 9AIL worked the east coast with a UV201A. 9AMI did some good work around Northerin Indiana using a 201A and 110 volts A.C. on the plate. 9CCL works in a radio store. 9BBJ has an 85 foot steel mast.

Dist. No. 3: 9BRK is also going to try the real short waves. 9CHG has one "op" standing a watch at 9BRK. 9BVZ's aerial is down but the set is working. 9BJL worked all inspection districts one night

enough to go after the T.D. Trophy, but he will make before dark. 9UT has worked a "six" at last. 9ADK worked four sixes using two UV201 tubes and 300 volts on their plates. 9CYQ puts nearly 400 watts in the antenna. Shades of WGH!! 9AUB is back on the air with a "fifty". 9VC sold his set and then started all over again. 9AXH occasionally handles a few messages. 9AUD is working on forty meters now. All the Indianapolis amateurs are preparing for the convention. All the fellows in Terre Haute not busy preparing to graduate from high school are trying to get their sets operating on forty meters.

Traffic: 9DXI, 21; 9DHJ, 14; 9BDB, 10; 9UT, 9; 9AXH, 9; 9AUC, 8; 9CAP, 8; 9AXX, 7; 9BRG, 6; 9BYI, 5; 9DTL, 4; 9AIL, 4; 9EEY, 4; 9CCL, 3; 9DLZ, 3; 9CSC, 2; 9AMI, 1; 9DKT, 1; 9OG, 132; 9BBJ, 106; 9EJU, 54; 9MM, 42; 9EFZ, 41; 9EG, 41; 9BVZ, 34; 9DYT, 31; 9BKJ, 30; 9BJL, 25; 9ADK, 25.

ILLINOIS—Dist. No. 1: With the article in the last *QST* about the "Rag Chewers Club" I believe the amateur will get back some of his old friendliness.—A.D.M.

9AVH is operating on forty and eighty meters. 9DGH has taken another drop to forty meters, but he reports 80 meters the best. 9ET spends a good deal of his time operating a new Galesburg eighty meter station which is reported to be the last word in efficiency. 9BHT has been very busy making a portable transmitter and receiver which he expects to take to the west coast.

Dist. No. 2: Stations in Joliet are coming to life, and we are very glad to have some stations in a much needed spot. 9ALF has been doing some good short wave work on some special tests run by the League. 9BRX is steadily working on a forty meter wavelength. 9BUK lived at 9BRX's station until June fifth.

Dist. No. 3: 9ATT is the new D.S. All stations must report to him on or before the fifteenth of each month. 9CSW operates on forty meters now.

Dist. No. 5. 9BDA is using a portable set. 9BLO did some good work during the tornado.

Dist. No. 7: The Chicago "gang" are sorry to lose Marquard, who has left for the west coast. Wirth, 9DPC, bought a "flivver" and now he can't buy tubes. 9DGK and 9BE did some good work during the tornado. The Chicago fellows slipped this month on handling messages, due to the warm weather, but the old timers are still on the job.

Traffic: 9IX, 162; 9NV, 149; 9BRX, 56; 9BZE, 50; 9CN, 37; 9AIO, 31; 9DWX, 30; 9RQ, 29; 9AAW, 27; 9JO, 13; 9EEX, 11; 9APY, 10; 9ATT, 9; 9BIZ, 9; 9AWU, 7; 9DZR, 7; 9GE, 6; 9BHT, 6; 9AHJ, 6; 9DBA, 5; 9DGA, 5; 9CA, 3; 9DHQ, 2; 9AOR, 2; 9AVH, 1; 9ARM, 1.

DAKOTA DIVISION

D. C. Wallace, Mgr.

MINNESOTA—This is the last month that the present A.D.M. can be with you. (Thanks for the cooperation, men, it has been a pleasure to work with you!—A.D.M.)

Dist. No. 1.: **Get down on to the lower waves and forget about static.** Let's have all stations reporting, too, so we can keep in touch with them. 9AND is now a commercial operator. 9AEI has been elected City Correspondent, besides being C.M. and chairman of a Vigilance Committee. 9AYQ operates occasionally. 9ADS has a "fifty" going. 9BMR sent in a good report. 9AOG is still using "201A's". 9CWN is being heard again.

Dist. No. 2: 9ACT, 9RD, and 9DDB are new O.R.S. 9COF and 9DDP have rebuilt their sets. 9AXS tried operating on forty meters, but likes the eighty meter wavelength better. He uses a single wire aerial and counterpoise. 9ANJ was bothered with a bad power leak that hindered reception. 9SW is getting lonesome on the longer wavelengths and may change to some of the shorter ones. 9AWM, 9MF, and 9DSW spend most of their time at 9XI. 9MF has done some receiver building for the lower wavelengths. 9JI has taken the commercial examination. 9EFD has trouble making his set work on forty meters. 9CAJ operates regularly. He is our high traffic man. FB! 9MB is rebuilding his set. 9BBV has a new antenna and counterpoise. 9CPO operates every day, and works across the Pacific regularly.

Dist. No. 3: 9CPM handled most messages this month. 9APE is tubeless, but the C.M. doesn't mention why. 9DYZ is doing fine work on eighty meters wavelength. 9ASW is erecting a new antenno. He plans to handle a lot of traffic this summer. 9BMX is heard all over the country. He uses one "fiver" and a forty meter wavelength. 9XI is consistently working on forty and twenty meters wavelength. This is shown by their traffic totals and long list of foreigners worked. 9ZT works Japan, NRRL, Australia, New Zealand, and KFUH regularly.

Traffic: 9BMR, 25; 9EEP, 19; 9DKR, 13; 9AOG, 2; 9AYQ, 2; 9CAJ, 64; 9SW, 38; 9CPO, 21; 9EFD, 21; 9ANJ, 15. 9MF, 12; 9DDP, 7; 9BBV, 6; 9COF, 3; 9DDB, 2; 9AWM, 2; 9ATC, 1; 9RD, 1; 9CPM, 189; 9XI, 97; 9IG, 91; 9ZT, 37. 9BNK, 23; 9DGE, 23; 9DYZ, 16; 9ELJ, 9; 9DDV, 7; 9BMX, 7; 9DAW, 3; 9BIS, 2. 9APE, 2.

SOUTH DAKOTA—Dist. No. 1; 9DIY is rebuilding and will be heard soon with two "fivers" on eighty meters and with a "fifty" on forty, twenty, and five meters. 9CKT has had too much school work to do.

Dist. No. 2: 9TI's auto business keeps him busy at this time of the year, but he is doing fine work on twenty meters nevertheless. A new station is being built at Edgmont by Mr. C. G. Hyatt. 9EH is installing two "fivers" and an enameled wire antenna for short wave work. His regular equipment includes two "fifties" which are being operated on the 150-200 meter wavelength band. 9AGL has worked NRRL and hears New Zealand stations "FB" on forty meters. 9DXR is building a new antenna, as an industrious tree has grown around the present one. 9DZI is rebuilding. He leads the district in traffic handling. 9CBF's new auto business keeps him pretty busy. 9BDW has been doing daylight work on eighty meters. 9DGR lost a "fiver" but he is back with another. 9BOW is heard regularly. He too uses a "fiver". He has good routes in all directions, especially west and north. 9CGA and 9DBZ have consolidated. They are operating a "fifty" on the different wavelengths. 9NM operates regularly and is ready to handle all western traffic. He uses a "fiver" with a dynamotor plate supply. This station and several other western stations are rapidly filling out this part of the state. We will soon be ready for some regular routes. 9BKB is getting ready to operate on forty meters. 9CKD is rebuilding his home, and he will include a special radio room. The D.S. is optimistic about building a first-class organization. Lend him your support by getting reports in on time. 9CJS is heard regularly. He is doing fine work on our four upper wavelength bands.

Traffic: 9BKB, 7. 9BOW, 4; 9DGR, 3; 9DBZ, 37; 9BDW, 7; 9CBF, 21; 9TI, 5; 9DZI, 52. 9AGL, 6; 9DXR, 22; 9CJS, 46; 9DIY, 3; 9CKT, 5.

NORTH DAKOTA—The amount of traffic handled in North Dakota decreased considerably this month. A large number of stations were successful with the short wave work, however, and this should increase traffic totals during the summer.

Dist. No. 1. 9CSI is the most active station in this district. He keeps a noonday schedule with a number of stations.

Dist. No. 2: 9DBR and 9BZF are heard regularly and are handling traffic in all directions.

Traffic: 9CSI, 7; 9DBR, 7; 9BZF, 10.

DELTA DIVISION

B. F. Painter, Mgr.

WE believe that this Division is growing and that things will be better from now on. There have been several serious matters to settle before the new D.M. could get things running smoothly. Our entire time can now be given to handling the Division and we renew the statement that we will be willing to assist any member of the Division in any way that we can. We want to hear from all the members.

MISSISSIPPI — This state is now under a new A.D.M. June W. Gullett, 5AKP, Meridian, Miss. The Meridian Amateur Radio Club offered a prize of one

rear's subscription to QST for handling the greatest number of messages. This was won by 5AQI. 5AQI is a new League member and was only operating fifteen days. 5AGS and 5ARB tied for second place. This Meridian "gang" is the livest in the Division. 5FQ is great on "DX," but he handled no traffic. 5AGS starts for camp June first. He will have a portable set with him, using the call 5AGM. W. Janin resigned as A.D.M. due to sickness in his family. He will be off for some time. 5QZ is a real O.R.S., though travelling in California he reports on time.

ARKANSAS—The A.D.M. has returned from his vacation but he has not had time to make his report. 5AW reports that he "shot" his MG set. 5QH lost a "fifty" but is on with a "fiver." 5ANN and 5AQN made their regular report of traffic handled. The rest of the state is quiet. Why?

LOUISIANA—We are unable to get anything from the New Orleans crowd. There has been no A.D.M. appointed, as we cannot get any recommendations. The Shreveport C.M. reports a new station. Dean 5AGJ is on eighty meters with a "fiver." 5RB is heard occasionally. He is taking a portable set to camp this summer. 5ANC has not yet been heard with his new set. 5ML of Oil City, is now located at Cedar Grove, In. 5WY operates on twenty and forty meter wavelengths.

TENNESSEE—5JV has a new method in use for extracting a report from the "hams". He sends them a short note requesting their report for the month and leaves a space at the bottom for the report. They return this to him and he sends it on to the A.D.M. (FB, Sutton!—A.D.M.) 5GR sold his "junk" and is operating WCBQ with the help of 5FV. 5FV is the only station in town that can operate on twenty and forty meters. 5AEK worked Canada, Mexico and the West Coast. He handled a nice bunch of messages. After the first of the month Tennessee will become part of the fourth inspection district. New "4" calls will be assigned. 5CN will sign 4KM. The big phone station, 5AMF, will hereafter sign 4AM. 5AAE has moved back to Chattanooga. He will operate 5XAT.

Traffic: 5AEK, 30; 5AEQ, 5; 5AGS, 45; 5AGZ, 1; 5AKP, 45; 5ANB, 35; 5AQI, 108; 5AQY, 8; 5ARB, 45, 5AUR, 9; 5CN, 15; 5ER, 2; 5KA, 25; 5JV, 35; 5QZ, 24.

HUDSON DIVISION
E. M. Glaser, Mgr.

TRAFFIC, while never heavy in any part of the division, has dropped off a good bit. Most stations operate on a definite frequency all the time, although some stations can operate on several wavelengths at a minute's notice.

All stations are urged to lend all possible aid to the Vigilance Committees in their vicinity. Cooperation has been good in some cases but not so good in others. Please do all you can to help them.

Next month one paragraph at the beginning of this report will be devoted to the best "DX" work for a given power under given conditions done by any station in the division. Stations doing what they consider real good work shall drop a postcard to the D.M. with full details and he will judge the best half dozen stations. Also, A.D.M.'s are to write a short paragraph at the beginning of their report, stating the best traffic work done in their section of the division. Any unusual work of any kind should also be stated.

The D.M. wants to thank all the officials for their excellent work and cooperation. Every report comes in regularly and it certainly is a pleasure to find none missing. Keep up the fine work, men. Don't forget any suggestions that you may have to better conditions.

NEW YORK CITY—2BBX and 2CYX handled the most Bronx traffic. 2BEE is doing good "DX." He is operating on forty meters. 2SM is going down there too. CVL has installed a "fifty." 2AMJ works the coast often. The Radio Club of Brooklyn will hold unparliamentary meetings during the summer. 2CLA has been recommended for appointment as an O.R.S. 2PF is operating on twenty and forty meters with a "fifty." 2ABR has no time for radio. 2CRB is building a new "shack." 2CTY is doing good work. 2WC has a new junior "op." Congrats.

Traffic: 2SM, 32; 2BEE, 29; 2BBX, 78-d9; 2CVL, 32; 2VYX, 62; 2AMJ, 28; 2BO, 36-d4; 2WC, 16; 2CTY, 39-d4; 3CRB, 24; 2WZ, 22; 2BRB, 11-d2; 2AEP, 14-d1; 2CHK, 4; 2LD, 14; 2LA, 1; 2KR, 28; 2CZR, 38; 2AQL, 1; 2ACZ, 83-d9; 2AKK, 12-d1; 2CEP, 8; 2CIS, 7; 2AVB, 5; 2AHZ, 2.

EASTERN NEW YORK—Dist. No. 1: 2AV burned out a few filaments. 2KX handled a few good messages and worked many distant stations.

Dist. No. 2: 2CNS was heard in five European countries, and in Brazil. 2BQB is rebuilding. He is waiting for some "S" tubes to arrive. 2AJP has been operating and seems to be doing good work. 2AHK handles the most traffic in the district. 2COV is getting a Vigilance Committee started. 2AAN handled a nice batch of messages. 2CIL is studying for a commercial examination. He intends to hit the briny deep very soon. 2AG continues to be the star "DX" station. 2DD is building an 18-42 meter transmitter. White Plains will need a City Manager.

The White Plains High School Radio Club may affiliate with the Second District Executive Council.

The District Superintendent's new address is Box 113, Yonkers, N. Y.

Dist. No. 3: 2CUL, a new O.R.S., sent in a good report. He worked England and Holland. 2SZ isn't operating much because of coming examinations. 2AGM is rebuilding his station. 2CTH heard some New Zealand stations but couldn't raise 'em. 2ANM is using a "fiver."

Dist. No. 4: 2CYM is now working on eighty meters. 2CXG is busy with school work. 2AQR manages to operate some, however. 2AKH is doing fine work with two 201A's. 2BSE is doing good work. 2CNP is busy and not operating much. 2AGQ is on forty meters. He has worked several European and west coast stations. He received one report from Australia.

Traffic: 2KX, 15; 2AV, 6; 2AHK, 88; 2COV, 3; 2CNS, 2; 2AJP, 10; 2AAN, 26; 2AGM, 2; 2CUL, 4; 2CTH, 9; 2SZ, 3; 2ANM, 11; 2CYM, 14; 2CXG, 2; 2AKH, 16; 2AGQ, 42; 2BSE, 9; 2AQR, 28.

NORTHERN NEW JERSEY—The D.S. will be away this summer and later he will attend college. A new D.S. will have to be appointed. Anyone in Dist. No. 1 interested in the job will please communicate with the A.D.M. immediately, so that no vacancy will exist when Mr. Van Riper leaves. It is with deep regret that we announce his leaving. 2CTQ worked 1ER on extremely low power. 2ADU has installed a new antenna. 2BIM is operating on forty meters with fine results.

Dist. No. 2: 2CDR has installed "S" tubes. 2ZB is operating on forty meters wavelength with a quarter kilowatt tube. 2BAW is hoping for more traffic with better operating. 2JC is the Bloomfield Radio Club. 2EY is handling traffic well in all directions. 2AXF has been doing excellent work on twenty meters with a UV 203A. Another station using a forty meter wavelength is 2BW. 2BKR surprised us with a good report. 2ABS and 2TP are using a "fifty." 2PK maintains a five meter testing schedule. 2AFC and 2CRP are the active stations in Bayonne. 2EG and 2CQI are rebuilding.

Dist. No. 3: 2ACO needs to advertise for some local traffic of start. 2CQZ has three transmitters in operation on different wavelengths. 2QS is busy with his Vigilance Committee work. 2AEY is a real traffic station. He manages to average four hours a day at the key.

Dist. No. 4: 2FC will be off for a short time, due to the loss of his "thirty." 2BCI worked many distant stations. Several messages were handled for the Dirigible "Los Angeles" when the short wave outfit at Lakehurst broke down recently. 2BUY finds it difficult to do both "DX" and traffic since spring. 2AUH will be operating on twenty and forty meters wavelength with a new fifty watter. 2BZJ is doing very good work in the daytime. 2CPD handled most messages for Northern New Jersey.

Traffic: 2WR, 8-d2; 2CTQ, 34; 2AT, 14; 2ADU, 6; 2AJA, 5; 2CYV, 5; 2BIM, 4; 2ATE, 2; 2AXF, 6; 2AFC, 32-d1; 2CRP, 32-d4; 2BKR, 46; 2EY, 4; 2BW, 6; 2BAW, 33-d1; 2ZB 22-d7; 2CDR, 32; 2CQZ, 3; 2CRW, 6; 2QS, 29-d7; 2BQC 6; 2AEY, 47; 2AEK, 2; 2CYW, 8; 2ACH, 14-d2; 2ABC, 4; 2BZJ, 10; 2CPD 68; 2FC, 4; 2AUH, 4; 2BUY, 8; 2BGI, 19.

MIDWEST DIVISION
P. H. Quinby, Mgr.

MISSOURI—New appointments of Traffic Department officials have been made in the Midwest Division.

District No. 1: 9DNX is D.S. of the city and county of St. Louis. The following are new O.R.S. appointments: 9ZK, 9DMJ, 9ASX, 9PW, 9DXN, 9DCW, 9BHI, 9ACI, 9DOE.

Dist. No. 2: 9DAE is D.S. of all territory in the present second district to which has been added all of N. E. Missouri north of the Missouri River at present in Dist. No. 1, except Jackson County. New C.M.'s are: 9BVK, Sedalia; 9AOB, Carthage; 9RT, Columbia. A new C.M. for St. Joseph will soon be appointed. The following are new O.R.S. appointments: 9CHE, 9DAE, 9BRU, 9DIX, 9EAO, 9RT, 9AJD, 9AOB, 9BVK, 9BUE, 9AYK, 9CRM, 9DOO, 9DNJ. Ex-9EGS is now in New York.

Dist. No. 3: 9BSH is D.S. of all that portion of Southeastern Missouri that is south of the Missocri River and east of the former Dist. No. 2. The following are new O.R.S. appointments: 9BSH, 9DWK.

Dist. No. 4: 9ZD is D.S. of Kansas City and Jackson County. The following are new O.R.S. appointments: 9RR, 9AYL, 9FM, 9ST, 9ZB, 9AHZ, 9BDZ, 9ACX, 9BKO, 9DOJ, 9ADR, 9ELT.

9AOB reports "QRN" bad. 9BVK put up a new aerial and the wind turned it wrong side out. It works anyway. 9UI built a portable set for Boy Scout camp work. 9BVK will handle the Sedalia end of that route.

9ST, 9TJ and 9ADR lead in traffic handling this month. Other stations handled little, due to "QRN" and school work. 9ZD has been working with "oscillating" crystals.

Traffic: 9AOB, 19; 9AYK, 10; 9AZL, 4; 9BUE, 4; 9CRM, 2; 9DAD, 6; 9DAE, 10; 9DJI, 3; 9DKG, 14; 9ADR, 22; 9BKK, 13; 9ELT, 4; 9RR, 6; 9ST, 91; 9TJ, 84; 9ZD, 2.

NEBRASKA—Dist. No. 1: Traffic through Omaha is exceptionally light and no regular schedules are being kept by any of the stations. 9DUO has had a hard time keeping tubes very long. He operates on forty meters wavelength and is securing very good results. 9CIM is operating fairly consistently. 9BFG has been heard lately. 9CJT is operating actively on forty meters wavelength. 9BGK operates a twenty and a forty meter transmitter simultaneously. 9BNU at Fremont reported traffic light. 9DPS is trying to get a twenty meter set working and he is often heard on a forty meter wavelength. 9BYG, a new O.R.S. for Omaha, should make a good showing as he is a telegraph "op."

A few stations failed to report this month. It must be remembered that to hold an O.R.S. appointment it is necessary that a report be made every month whether or not any traffic is handled.

Dist. No. 2: To date no report has been received from the Superintendent, probably due to the fire at his home and station.

Traffic: 9CIM, 34; 9EB, 33; 9DPS, 14; 9DUO, 2; 9CJT, 2; 9DXY, 2.

IOWA—D.S. Bailey reports that business is picking up a bit in his district. 9CGY has been having tube troubles. 9AVJ is with us again with a big message total. 9AVJ has a lot of support from BCL's who give him messages for neighboring broadcasting stations. He also has been carrying a portable transmitter around with the baseball team. He handled 394 messages in seven days in this way. 9CWG is operating on the short wavelengths. 9HK has two "fifties." 9BCD is operating a single "fifty." 9BZE says that ex-9CHD is after "DX" with the "Javelin." 9CS handled traffic, using both a tube transmitter and a "spark" set. 9BRS-9CLG is the only station in Des Moines that handled any traffic.

Traffic: 9AVJ, 579; 9DAU, 28; 9DOA, 5; 9HK, 26; 9BCD, 29; 9BZE, 5; 9CS, 43; 9AED, 2; 9BEW, 78; 9BKV, 81; 9BRS-9CLG, 108; 9CZC, 36; 9DEX, 95; 9DZW, 35.

KANSAS—The short wavelengths do make it possible to ignore the effect of "QRN." 9DNG, who is still waiting for that "fifty" is hearing many good "DX" stations on forty meters. But two active stations are operating at Kansas City. 9NA handled a little traffic. 9CKM has closed his station for the summer. 9ACQ has moved to a new location in Atchinson and is operating on a wavelength of forty meters. 9CVL, using a "fiver," turned in a dandy traffic report. He was heard in France. 9BGX is still doing much operating in daylight. 9CEI is still receiving cards on his last winter's "DX" work.

Traffic: 9CVN, 39; 9BLB, 7; 9BRD, 1; 9BIO, 1; 9CCS, 6; 9BGX, 5; 9BVN, 20; 9BXG, 14; 9CVL, 71; 9EHT, 4; 9ACQ, 16; 9CFI, 36; 9NA, 7.

NEW ENGLAND DIVISION
I. Vermilya, Mgr.

RHODE ISLAND—A great deal of interest is being shown in forty meter transmission in this state.

1BHN will be off the air for the summer. 1OW has been too pressed with really urgent affairs to be operating much, but in spite of this he has handled some traffic. 1GV feels the lure of the open spaces. meters. 1AEI is heard occasionally pounding them out in great shape. 1BHI is rapidly becoming more active. He will soon be an O.R.S. 1AID is doing wonders in the traffic handling line. She works on forty meters. (How do you do it, Mildred?) She is getting out well, too. 1AWV is using one "fiver" *NOT* overloaded. 1II-1ZS has been making some changes in his station. He, 1CMP, and 1OW are out to give the "gang" some competition.

Things are stirring in Newport. 1AFN and 1AOA are handling traffic in good shape. 1AAP is getting out well with his two "fivers". 1BVB has a new shack and he is getting ready to use all wavelengths below eighty meters. 1AWE, using forty meters, has worked all districts, England and Holland.

Traffic: 1BHN, 3; 1OW, 25. 1GV, 3; 1ABP, 17; 1BGR, 1; 1AID, 55; 1II, 2; 1AAP, 17; 1BVB, 24; 1AWE, 13.

MAINE—Things have been somewhat upset in this state for the last month, due to the resignation of A.D.M., Dick Chase. We had an election and, by popular vote, Wheeldon, 1EF, of Ellsworth, Maine, is your new A.D.M. and the man to whom you should send your reports.

1KL and 1BNL were actively engaged in handling traffic. 1IT has been experimenting. 1BTT is now using two "fivers". "S" tubes and a 30 henry choke give him a pure note. 1QE has done some good low-power work at the University of Maine this year. 1BNL says that the short wave transmission is the "berries". He worked 9CXX in daylight. 1KQ, 1VF and 1BNL travelled to Boston in 1VF's "fiver". They all got new operator's licenses from the Supervisor. They had a wonderful time on the road. (Hop to it, boys! Send your reports to the new A.D.M. and give him all the cooperation possible.—D.M.)

Traffic: 1QE. 22; 1KL, 19; 1BHL, 48.

EASTERN MASS.—This part of the map has also had a change of A.D.M.'s. The election, a close one, resulted in Miss Gladys Hannah, 1KY, 3 Sumner Road, Cambridge, Mass., being elected the new A.D.M.

For the first time in the history of the New England Division a lady will be the A.D.M. Send your reports to her, fellows. Show her you know how to cooperate.

1KY says that the 201A tubes are still holding their own. 1ZW wants to go on record as supporting any good O.R.S. as A.D.M. It was a good close race. Let's all pull together now for 1KY. 1SA is operating on forty meters. 1CPQ has been appointed O.R.S. Phipps was formerly 2CPQ, and he holds a commercial operator's "ticket". 1BUO is working on forty meters, and he reports most foreign "hams" coming in louder than the locals. NRRL was also heard.

Traffic: 1KY, 16; 1COT, 18; 1ZW, 8; 1SA, 38. 1CPQ, 33; 1BUO, 29.

NEW HAMPSHIRE—1BFT had the misfortune to have his station completely destroyed by fire. He will be on the air temporarily with a ½ K.W. spark while he is rebuilding. 1BJF is on every evening from 5:45 to 7:30 p.m. He operates on a seventy-five meter wavelength and is looking for all the traffic he can get. He was heard by 6UV. 1ATJ is on forty meters. He will be glad to handle traffic.

Traffic: 1YB, 100; 1AVL, 55; 1BJF, 53.

WESTERN MASS.—Dist. No. 3: Pittsfield hams were honored during the month by having Secretan

of g5LF visit them. He came over on the Cunard Liner Samaria, using the call g6YM. Both 1ARE and 1XU worked him several times on forty meters on the way across. 1VC is handling a large amount of traffic for this district. He was high man during the past month. 1CLN has instituted a drive to clean up unfiltered plate supplies. That's fine, OM! If all districts will follow suit we will have some good notes in Western Massachusetts.

Dist. No. 4. Our stations are dropping to forty meters very fast lately. Wonderful records are being made. 1PY worked NRRL when he was at Honolulu. He was QSO z2AC and a2AJ during the month. Fine work, OM! 1AWW and 1BLU report fine "DX" on the 37-42 meter wavelength band. 1AWW worked the West Coast. He heard rCB8 and f8QQ. 1ABF operates on forty meters. We hear that he has lost another tube. In the Emergency Railway Communication System, stations 1AWW and 1BLU in Springfield have been selected to handle this work.

Dist. No. 5: 1BIZ and 1SZ report wonderful "DX" using twenty and forty meter wavelengths.

Dist. No. 6: 1BOM and 1BC are heard frequently.

Dist. No. 7: 1AKZ and 1BQK report "DX FB". They are using a forty meter wavelength. The Radio Inspector visited 1BBP and complimented him on his equipment. They had a get-together and feed while he was there. 1XZ is "QSO" Europe and the West Coast. New Zealand was copied on wavelengths of forty and twenty meters. 1ASU is now running a "fifty" and two "fives" are used on a wavelength of eighty meters. Both stations sign 1ASU. 1AQM has moved. The Worcester "gang" had a real HE-man's stag party at Sterling, Mass.

Traffic: 1AAL, 6; 1AKZ, 14; 1ASU, 22. 1BKQ, 10; 1BQK, 4; 1DB, 8; 1XZ, 3; 1BIZ-1SZ, 20; 1VC, 31; 1PY, 8; 1ABF, 16; 1BLU, 8; 1CLN, 7; 1ARE, 7; 1AWW, 20.

VERMONT—1BIQ is another new O.R.S. The Poultney "gang" are planning to hold another convention next September. They put over a good one for a starter last summer. 1ARY and 1YD have been "QRW" baseball, track, and incidentally, final examinations. They have both been on regularly. 1BDX has been out of town about half the time. 1CQM is going to New York this summer. The other stations are busy with the usual activities.

Traffic: 1AJG, 54; 1AC, 43; 1BDX, 26; 1ARY, 22.

CONNECTICUT—The following is the pedigree of some of our stations: 1BM is a manufacturer of ladies' fancy garters. When the wind blows and you happen to notice the rainbow just below the knee remember Nichols! 1MY is a "Reub", a regular dirt farmer, and a grower of some of the tobacco you smoke in those "bum" cigars! 1IV attends college. 1ZL is Radio Editor of a Bridgeport newspaper. 1AJT sells wedding rings and other kinds of jewelry. 1CKP is connected with several manufacturing concerns. He is the Father of us all. 1AOS attends Clark College in Worcester, Mass. 1AVJ is in the laundry business. He does not wear a "pig tail"! We want to get acquainted with you. Please send in your occupation with your next report.

The Bridgeport "gang" are going strong. 1ZL works some more foreign stations. 1AOX and 1AFL are the two latest new stations to send in reports. 1IV "Old Reliable" can be heard on forty meters and eighty occasionally. 1BGC has been doing some great daylight receiving. 1ADW wants to become an O.R.S. 1GC is a new reporter. 1CPV has moved to Springfield.

Traffic: 1CKP, 19; 1AH, 38; 1AWY, 30; 1AFL, 7; 1ZL, 15. 1CTI, 1; 1BGC, 6; 1IV, 19; 1ADW, 12; 1BFI, 4; 1AYR, 3; 1CTI, 1; 1AVX, 6; 1MY, 44.

NORTHWESTERN DIVISION
Everett Kick, Mgr.

NRRL has been worked by about every forty meter station. FB OM's. Quite a few ORS were cancelled this month. We want to have some real consistent stations in their place. If you think you are one of these why not apply?

WASHINGTON—A number of stations are doing good "DX" on the shorter wavelengths. 7OT worked j1AA with a "fiver"—how many watts input? 7DF again leads the traffic handlers. 7OY is second, a new ORS. 7GB worked a4AG, a2DS, NRRL and KUFH at Pearl Harbor. Rebuilding stations seems to be a popular activity at Tacoma—what's the secret? Seattle has lost a couple of good hams by the marriage route. 7FD and 7MA were the victims. 7UU is back from Montana. Newcomers to be on soon are 7UZ and Ex-6AP. 7BL, 7BU, and 7HO will also be heard soon. 7ABB was on quite a bit. 7ZZ es 7DC in Bremerton handle a lot of business from NRRL. Eastern Washington is represented by 7AO, 7DM, 7RY, 7AF, and 7GE. 7RY worked 2BY with only four watts input.

Traffic: 7DF, 100; 7OY, 78; 7GB, 68; 7OT, 52; 7AO, 87; AFO, 35; 7ABB, 33; 7RY, 25; 7GE, 24; 7PZ, 20; 7GR, 19; 7KU, 17; 7WS, 10; 7ABF, 10; 7DC, 10; 7AF, 9; 7DM, 9; 7FN, 8.

OREGON—The gang is consistently working the East coast using twenty meters without difficulty. 7EO and 7EC made applications for ORS. 7ADM has worked a station in Samoa using a 201-A tube. 7LQ and 7GJ are tuning their sets to a 40 meter wavelength. 7IP, 7UJ, 7CN, 7EF and 7AJB are all heard occasionally. 7GQ is in touch with the East Coast on 20, 40 and 80 meters. He did a lot of daylight work using the shortest wavelength.

Traffic: 7LQ, 25; 7EC, 20; 7CW, 16; 7GJ, 15; 7YK, 13; 7OK, 12; 7GQ, 12; 7ND, 12; 7ADM, 8; 7VQ, 5; 7MF, 5; 7QD, 2.

IDAHO—Several new stations have opened and others are making the prospects bright for the next "DX" season. A new D. S. Miss 7SI was appointed. Send your reports to her from now on if you live in the Southern part of the State. 7AHS sent his report in by radio this month. 7GW is working on eighty meters as usual. 7OL and 7MU have dissolved partnership, as 7MU has moved to American Falls.

Traffic: 7OB, 60; 7SI, 49; 7IU, 18; 7GW, 8.

MONTANA—7WP, the former ADM, resigned and only a partial report of the activities of the state was gathered. We thank 7ACI for his good work. If it wasn't for him no report would have been received. We regret losing 7WP, but he had other duties to perform. 7NT, his successor, is very capable and willing to perform the duties of the office.

Traffic: 7MX, 37; 7DD, 17; 7NT, 1.

PACIFIC DIVISION
M. E. McCreery, Mgr.

SUMMER is showing its effect on the Pacific Division by slowing down activities somewhat.

The Hawaiian amateurs have been stimulated by the visit of Schnell and Babcock from NRRL.

New Certificates of Merit have been introduced by McCreery. It is hoped they will boost traffic handling activity throughout the Division.

NEVADA—Much interest in twenty and forty meters work is being shown. 6AJR, an old timer, will be on regularly and he has made an application for an O.R.S. certificate. 6AJP is transmitting on the shorter wavelengths. He uses a wavelength of 81 meters for traffic handling. 6UO is having trouble in raising anyone, but expects to have a 500 watt "bottle" going and may have better luck then. 6ATN with a spark coil and 8 watts input worked five "nines" and 5AEK on an emergency set.

Traffic: 6UO, 9; 6AJR, 34; 6AJP, 8; 6ATN, 10.

HAWAII—The radio Club of Hawaii (6BUC) is constructing a new transmitter. 6ASR continues to handle most of the traffic. He will be transmitting on forty meters soon. 6OA works on eighty meters, but he is planning to drop to forty soon. 6ALS has trouble in putting out a steady signal.

Traffic: 6ASR, 19; 6ALS, 2; 6OA, 2.

SOUTHERN CALIFORNIA—"DX" weather was good, and many new foreign stations were worked, including a new country—Japan. NRRL comes through "very QSA" at all times. Traffic has almost doubled. Many of the fellows are going to operate on the twenty and forty meter wavelength bands. Activity around San Diego is increasing, due to the organization of the Silver Gate Amateur Radio Ass'n. Vigilance Committees have been appointed. The BCL's troubles are being settled for him. Any fellows who wish to work on these committees will please write the A.D.M. As stations improve new O.R.S. appointments are being made.

Dist. No. 1: 6CHS continues to lead the district in traffic handling. He has been "QSO" HVA, j1AA, Australia, and New Zealand. 6OP has been tormented with school work. 6AIB "blew" his fifty watter and

he is now using two "fivers" on forty and eighty meter wavelengths. 6HU has a "fiver" working on a forty meter wavelength. 6CNK has a schedule with 6CST in Hawaii. 6BIK is busy with school work. 6CGO continues to play around the five meter wavelength. 6AHQ is still "blowing fivers". He was heard in N.Z. 6SB worked several east coast stations using two "fivers". 6CGO has been heard in N.S. and off the coast of Japan. 6CHX "steps out" in good shape. 6ZH has been "QSO" HVA, the Philippine Islands and Japan.

Dist. No. 2: 6CTO uses wavelengths of 160 meters. 6RF is busy but handles his outfit occasionally. 6VC ranks first in message handling. 6BQR has a "fiver" "perking" occasionally. He bought a Ford instead of a 250 watter. 6IH changes his set around every day. The Pasadena fellows did the usual good work. 6BBQ worked j1AA and was reported by CB8. 6RN has dismantled his set for the summer but will be on again next winter. 6BH is again in operation with a DC plate supply. 6AJI has one of the best sections of the district. He has worked NRRL several times. 6CIA says he has very little time for relay work. 6US reports his business slack, enabling him to get on the air again. 6NE is on 41 meters with two "fifties". "Brass" is not the only thing he pounds—you should see him pound the "ivories". 6CSS worked NRRL.

Dist. No. 3: Many stations of this district are closing for the summer. 6AAN "blew" his tube. 6CAQ is making a new wavemeter. 6JJ is remodeling his antenna intending to work at the fundamental. 6ASY is transmitting on the shorter wavelengths. 6CGD expects to be going as soon as his motor-generator set is fixed. 6AKZ is on regularly. 6CMD is stepping out with a "fifty". 6CDG has installed a chemical rectifier and is using the call 6CWF. NRRL hasn't been coming through very well.

Traffic: 6CHS, 463; 6CGC, 37; 6AHQ, 27; 6ZH, 10; 6HU, 36; 6CNK, 11; 6CHX, 7; 6AIB, 6; 6BIK, 5; 6SB, 14; 6OP, 2; 6VC, 316; 6CSW, 5; 6RF, 4; 6CTO, 55; 6AFG, 36; 6BJX, 94; 6BBV, 20; 6CG-6CBB, 8; 6IH, 5; 6BBQ, 64; 6RN, 78; 6BH, 14; 6CSS, 1; 6BUR, 17; 6CIA, 12; 6NE, 6; 6AJI, 17; 6AKW, 17; 6CGW, 27; 6CAE, 8; 6AGK, 4.

CENTRAL CALIFORNIA—Dist. No. 4: The mighty 6OI with an underloaded "fifty" worked j1AA in daylight on twenty meters. He handled traffic with NRRL, worked many A's and Z's on forty meters. 6CLP again tops the list of traffic handlers. The fact that only a "fiver" is used makes the work of this station stand out. 6NX received four "fifties" during the month and all were either broken or defective. Three cards were received within the same hour from Argentine, Australia and Belgium. If WNP had been on all directions would have been covered. 6AMM was "QSA" in Australia this month. 6BMW enjoys forty meter work. 6CEI operates very little. 6CJV was heard in South Africa. 6CLP is the best message handling station for this district. 6MP, with a "fiver", was heard in Australia. 6CJJ is reaching the East Coast in good style with a "fiver". 6CJD is busy with school exams but was on a couple of times. 6ADB has reduced his wavelength and is getting out in fine shape. 6AME got a replacement on a "fifty" and was tickled to death. He will be on twenty and forty meters soon. 6UF operated on a twenty meter wavelength all the month. He worked 1XAM with 30 watts plate input to his "fiver".

Dist. No. 5: 6DG reports "business as usual". 6CSL handled no traffic. He has been rebuilding his set to make it easy to change from a forty to an eighty meter wavelength in a few seconds. 6CHE is building a new synchronous rectifier. 6CLS worked N.Z., Japan and Australia. 6BAA has a portable transmitter using the call 6BVI. 6BIN-6CAN is ready to handle traffic in any direction. 6WS and 6ALA are two more of our new Official Relay Stations. 6CW has "worked" 1A2, who was off the coast of KOREA; also heard j1AA in daylight. 6AWW got some new tubes. He tried transmitting on five and on forty meters wavelength with little success. 6CPW still complains of "YL QRM". What's the matter, OM? Make her learn the code!

Dist. No. 6: 6BHM, a new O.R.S., reports traffic fairly good. 6CQG has two "fivers" and a new receiver which he is going to exchange for a Reinartz. 6CFG is raising funds for a new transmitter. 6SP is rebuilding his fifty watt set to operating on forty meters. 6BNU will operate on forty meters this summer. 6AVH is trying to beat his old "DX" record.

Traffic: 6NX, 1; 6OI, 13. 6AMM, 16; 6BMW, 11; 6CEI, 3; 6CLP, 62; 6MP, 9; 6CJD, 7; 6ADB, 7; 6UF, 9; 6AWT, 40; 6CHL, 5; 6DG, 11; 6BAA, 5; 6CLS, 10; 6AWW, 12; 6BIN, 27; 6CW, 6; 6RW, 13; 6CSN, 14; 6AUN, 13; 6BQL, 1; 6HH, 3; 6AMS, 11; 6HJ, 14; 6BHM, 24; 6CQG, 14; 6AVH, 7; 6CEI, 15; 6BSS, 7; 6ALX, 10; 6CCT, 274; 6BHW, 14.

Berkeley: 6GU is constructing a new antenna and remodeling his station. He will be on forty meters when he is heard again. 6AJF graduated from the University of California. He is taking a trip north this summer, but intends to listen on the short waves. 6ARB moved to Oakland to help them get their name on the map. 6BFU-6IM succeeded in getting across to South Africa on his "fifty".

Traffic: 6GU, 2; 6BFU, 80; 6CDP, 4; 6CLZ, 9.

Richmond: 6AOA-6RQ has been QRW college final examinations, but is building an eighty meter set and says he will be in the Brasspounders' League next month. 6EW is heard occasionally. 6CTX, a new O.R.S., has been working the East Coast consistently with a lone "fiver". 6ANW, another new O.R.S., hands in a good report. He has been trying to get his set working on forty meters, but has not had very favorable results yet.

Traffic: 6ANW, 25; 6CTX, 10.

ROANOKE DIVISION
W. T. Gravely, Mgr.

THE Division Manager is very anxious to have a "get-together" meeting in this Division this year. If we can get the required number of station owners to signify their willingness to attend and to help get the "gang" together we can put the thing over. Please write your D.M. *at once* and express your views, and also at what point you would like to meet the other members of this division.

NORTH CAROLINA—Dist. No. 1: 4OG, the only consistent station, is enjoying the "QRM" on 80 meters with the rest of the gang. 4LO is busy building a short wave set. 4TW will be off the air until winter, as he spends his summers out of town.

Dist. No. 2: 4MI has had some trouble with his set and is off the air at present. 4GW is working on a big set at his new location. 4SX, 4NJ and 4TS are heard occasionally. 4CK, 4PE, 4UM and 4VX paid a visit to the A.D.M. 4PE and 4UM turned in their report to the A.D.M. in person.

Dist. No. 3: 4HR is remodeling his set for eighty meter work. 4RY is doing excellent work on forty and eighty meters. His new home is at Montreat. 4WG is heard occasionally on eighty meters. 4JR is doing good work on 40 meters, and reports good signals from NRRL and KFUH.

Dist. No. 4: 4RW says he was only able to work a few stations through the QRN, so he has a small traffic total. (Try forty meters, OM, and your troubles will be over—A.D.M.) 4BX is just out of bed from an illness. 4UN rebuilt his set.

Traffic: 4OG, 25; 4LO, 2; 4UM, 6; 4PE, 5; 4JR, 101; 4RY, 44; 4RW, 9.

VIRGINIA—Dist. No. 1: 3MK is still the best station in the district. The "fifty" was taken out and the old "twenty" is back on the job. 3CKA has been using a forty meter wavelength. He is trying to get some traffic. 3CKK sent his report by amateur radio. FB!

Dist. No. 2: 3ATB got the rope circulating on his 70 foot mast. 3ABS has moved. 3AOT shifted back to the basement for the 'teenth time. 3SG will be an "8" this fall. 3BMN worked on forty meters. He was QSO the West Coast and g2KF. 3APR is pounding them out regularly. 3HM is working on 185 meters, but he says he has worn a condenser out trying to locate stations there. He will be on eighty meters soon. 3UY has dismantled and is rebuilding in hopes of getting more "pep" from his tubes. 3CBQ will operate a station with an eighty foot lattice mast. 3NO's little brother broke his "fiver"! He will be going again as soon as he gets a guard for the next one.

Dist. No. 3: 3BGS has had trouble with his power supply. In the future if the reports are not sent in promptly there is going to be a general slaughter and

a lot of O.R.S. certificates will be cancelled. Read them again and see what you signed up to do. We want you to live up to your agreement to make reports, and to make them promptly without having to be begged. (We do not want "drones" in our organization and we are not going to have them—A.D.M.)

Dist. No. 4: 3CKL has to work hard at school, but in spite of this he handled a number of messages. Traffic: 3MK, 24; 3CKK, 17; 3TI, 7; 3SB, 1; 3CKA, 1; 3BMN, 16; 3HM, 5.

WEST VIRGINIA—The Huntington "hams" held a get-together meeting May 16. No dues were collected, no officers elected, and no QRM was discussed. It was simply a get-acquainted meeting. 8DOI worked a lot of stations with an amplifier tube. 8AYP took part in some emergency work when the wires in Eastern Kentucky broke down. "Hams" came to the rescue and handled many messages for the Coal Companies. (FB—T.M.) 8CFE is out of the game now—"QRM from the YL's." 8AMD now works on twenty forty and is "getting our FB". 8DRR has returned from the West and will be on the air soon.

8BLI still uses the 75-85 meter wavelength band. He is constructing a transmitter for twenty and forty meter work. Traffic will be handled regularly on 75 meters. 8DSN and 8ATP are using a forty meter wavelength. 8AIP is working on eighty meters but he is trying to get down to 40 meters and get a good note. 8JZ has not been on the air, as he sold his low-loww (?) tuner. 8CCN handled a few messages on the lower wavelengths and worked a "six" with a "fiver". 8ALG is installing a 1500 volt MG outfit for his "fifty".

8ASE-8AXG is using a 500 watt German tube on the low wavelengths and he is getting out in great shape. 8AUL is the most active station in the city, both in DX and traffic. He uses a 50 watter on 80 meters. 8BSU is putting out good signals with a 50 watter on 40 meters.

Traffic: 8AUL, 53; 8ASE-8AXG, 50; 8DOI, 41; 8CBR, 28; 8AMD, 20; 8AYP, 11; 8BLI, 1.

ROCKY MOUNTAIN DIVISION
N. R. Heed, Mgr.

COLORADO—Not all of the Denver stations reported this time. 9CJY is C.M. Please send him your reports. 9WO and 9CJY are busy with school work. 9ABC was only on the air activiely for about two weeks. He handled quite a bit of traffic in that time. 9BXQ is getting good results on short wavelengths. 9CAW has been heard consistently. 9CDW says his folks don't let him operate while he is going to school. 9CAA was almost "pinched" when a "cop" thought he was trying to pick up some "YL's" at a local high school. As it was, he was waiting for one to play tennis with. 9DED has worked New Zealand, Australia, and NRRL often. 9BDF lost his only "fifty". 9EAM moved. He has some new "sticks" up already. 9BTO has had his certificate cancelled, as he is unable to keep in operation.

Dist. No. 1: 9AOI knocked down a 22,000 volt power transmission line for eight blocks when he hit a telephone pole with his car. 9DVL and 9AON in Ft. Collins are both doing good work.

Traffic: 9CAA, 107; 9WO, 15; 9ABC, 53; 9DED, 64; 9BXQ, 4; 9CDW, 12; 9DVL, 6; 9AOI, 51; 9AVV, 3.

UTAH—Salt Lake City: 6BLH blames the general lack of traffic for his lowered total this month. 6BUH finds it easy to work first, second and third district stations with a "fiver" on forty meters. 6RM was operating a transmitter together with 6CBU, but their tower blew down in a recent wind storm. This puts them off the air until another tower is erected. 6BTX and 6CRR, who have not yet received their O.R.S. certificates, handled a good number of messages.

OGDEN—6FM is at present the only active station. He is operating on a 78 meter wavelength with a "fifty" on 178 meters.

Traffic: 6BLH, 4; 6BUH, 3; 6FM, 7.

On the 30th of April a meeting was held in Salt Lake City, the A.D.M. presiding. D. C. McRae, 6RM-6ZBS of Salt Lake City, was chosen by popular vote to fill the position as Superintendent of Dist. No. 1. His appointment was approved by the D.M. and his certificate has been issued.

The meeting was attended by about fifteen amateurs, all of whom declared the meeting a big success. All expressed a desire that more meetings of its kind be held.

CANADA

THE outstanding events of the past month are better chronicled elsewhere in these pages, being the success of the Congress at Paris during which the I.A.R.U. was formed. Arrangements for the C.G.S. Arctic to carry short wave equipment again this year on her annual northward cruise have been made. Canadian affairs are going ahead steadily. A large number of stations are operating on forty meters. The longer distances can be most successfully bridged by the use of the higher frequencies.

One thing which the C.G.M. would like to bring to the attention of the Canadian amateurs is the desirability of at once becoming a member of the I.A.R.U. The subscription to the Union is one dollar per year, and under the constitution Canada is recognized as a separate nation, which automatically brings with it the necessity of having I.A.R.U. members to the number of at least twenty-five. Send in your dollar to K. B. Warner at Hartford, and become a world-wide amateur.

Another point deserves attention. Try to go to the A.R.R.L. Convention at Chicago this August. Every Canadian Division should be represented by at least one member; we hope to see you there.

MARITIME DIVISION
W. C. Borrett, Mgr.

THE D.M. thanks the Maritime Division fellows for the cooperation they gave Mr. Campbell, 1DJ, during his absence as official delegate to the I.A.R.U. at Paris. Mr. Campbell carried on in splendid shape. The first thing the D.M. did on returning to Hartford was to get hold of the Maritime report and read about the doings of the Maritime boys. This report appeared in the June issue, and we all agree that we had the right man on the job for this period.

The honors for the month of May go to 1AF of Jacquet River, N. B. Fenderson has brought the Maritime Division to the notice of the rest of Canada by working New Zealand 2XA on the 10th on 40 meters at 6:50 a.m. Now four of our stations are QSO New Zealand. How about it? Will other divisions please take note and publish number of stations QSO New Zealand? The New Brunswick "bunch" get on our Canadian wave of 120 meters nearly every night at 6 p.m. This is a good time for the Maritime stations to create a Division Rag Chewers Club.

1AF reports having visited 1EI, 1AM, 1AN, 1AK, 1AI, 1AD, 1BJ and 1AB. These stations are on the air and active. Summer has not dampened their enthusiasm. 1EI is QRW with extra work this month. 1AM worked f8QQ on 40 meters early one evening. All others report having worked many stations, but messages are scarce. The D.M. would like photos and more details about these stations through the A.D.M. when they send in their next report.

1AW of North Sydney reports that he is now on the road to recovery and is back on the air ready to QSO. 1ED is also on the job. 1AR reports having been copied in South Africa and is working on 40 and 20 meters. He has not handled much traffic as yet on these waves. 1DJ reports QSO Europe several times and spends most time on 85.6 meters. 1EB is also around 85 meters. 1DD has worked g2KF on many occasions on 40 meters before dark

and uses this wave and 120 almost exclusively. The advantage of 40 meters is the fact that very little QRM is caused to the BCL's and all Maritime stations are invited to come down when not engaged in Trans-Canada work. You don't get so much of the "pse QSL" stuff there either. 1AG of Moncton, N. B., has just received his ticket, and all stations are asked to keep an ear for him. 1BZ of PEI is still QRW with special course. 1CO and 9AK being the only active stations there.

Traffic: 1AR, 17; 1AF, 14; 1DJ, 8; 1DD, 9.

ONTARIO DIVISION
W. M. Sutton, Mgr.

OUR star station this month is 9AL. He leads the division in message handling. He "worked" f8RDI and g6YM using forty meters. 3NI raced him to a tie in message handling work. 3VH, by issuing O.R.S. bulletins to his local stations, has certainly kept his fellows "on the hop", and it seems worth while for other C.M.'s and A.D.M.'s to follow suit. Station owners have been appointed O.R.S. since our last report: 3HE, 3HP, 3WS, 3WG, 3QS, 3ACH, 3AF-9CC, 3IU, and 3AO. Activity is splendid and, if the majority of the O.R.S. can keep on the air throughout the coming summer months, we will be able to keep up the good work.

EASTERN ONTARIO—An outstanding feature of this section has been the forty meter operation of 3EN by our blind operator. He can "pound brass" and handle messages with anyone, and has given several of our operators a surprise. (FB, OM!) 3GV is operating again, this time on an eighty meter wavelength. 3DO and 3IU are mourning the loss of tubes. 3NF has installed an "S" tube rectifier and improved his note. 3HE, on eighty meters, has schedules with Toronto and WVAT, an army station of his, and is frequently heard on the West Coast. 3AEL and 3AFZ are on the air for traffic.

CENTRAL ONTARIO—3WG reports the erection of a new station in Guelph, 3AER. Here's a big surprise, fellows! 3OH is coming back on the air! He and the C.M. are building a new "3VH" receiver. 3QS heard NRRL and worked Bermudian "BER". 3MV sets a new mark for the "fiver" to shoot at, having been heard in Belgium, Holland and England. 9AL worked f8RDI and g6YM on a forty meter wavelength. 9BJ is another consistent station with a nice traffic total. 3VH lost his car in a bad crash. He is on twenty, forty and eighty meters regularly with a D.C. plate supply. He is using a compensated keying to eliminate backlash and key-clicks. He acted as host to our friends 3XI and 3AD on their recent visit to this city. We were certainly glad to meet these two live-wires, and we are pleased to know what a fine lot of fellows we have in our Ontario amateurs.

Traffic: 9AL, 44; 3AO-3MV, 42; 3KQ, 27; 9BJ, 20; 3QS, 17; 3VH, 10; 3GL, 10; 3EL, 9; 3PH, 8; 3AZ, 5; 3CK, 4; 3LY, 2; 3BR, 1.

WESTERN ONTARIO—Things are fairly quiet in Western Ontario. The forty meter wavelength is getting to be very popular. The A.D.M. visited the fellows in Galt and in Toronto during the month and saw the new Junio "op" at 9AL.

In St. Catherine's and the Niagara Peninsula, 3XX has the largest traffic report. 3DH keeps his two "fivers" working. 3KA is having trouble with his "fifty". He hopes to get it working soon. 3ZD finished his "fiver" and got a "fifty", but it went "West" within a week. 3KP's new tower is about ready for erection. In St. Thomas, 3ACO is still measuring antennas. 3ABG has a new "fifty". He craves messages. (Why not start some?—D.M.) 3IA has some new "S" tubes. A Radio Club has been organized in St. Thomas. It boasts of 150 members.

Traffic: 3XX, 42; 3XI, 19; 3MS, 14; 3KA, 8; 3DH, 2.

NORTHERN ONTARIO—3GG says that he is too old to change his wavelength now. He is still up in the heavens as far as the rest of the "gang" are concerned. We do not hear 3BG these nights and thinks the "flivver" keeps him out of doors too much. 3HP, one of our new O.R.S., heard a2DS on twenty meters one evening at 11 p.m. He has been hearing NRRL consistently at noon. 3WS is also a new O.R.S. 3WS senior is at present at Loon Harbor operating commercial GR, where he expects to install a "fiver" for short wavelength operation soon. His brother is helping 3NI to operate, using "A" as a personal sign. 3AAZ is experimenting with receivers for use on the shorter wavelengths. He says that metal and plates on condensers kill the signal strength. It is rumored that 3AR is in some "one-horse town" in Manitoba operating for the C.N.R., and that he has no power supply for a transmitter. 3NI is now the proud possessor of a W.E. "fifty" after his many unsuccessful attempts in trying to get out of the five-watt class.

Traffic: 3NI, 44; 3WS, 12; 3HP, 11.

QUEBEC DIVISION
J. V. Argyle, Mgr.

2FI, 2AX, 2FO, and 2CG continue to send and receive on forty and twenty meters except on Wednesday nights. They hear Australian and New Zealand stations every morning as well as NRRL. 2AX was heard in Australia. 2BG operates frequently. European stations get his signals well. 2BE and 2CI continue their usual good work.

2BN has a new transmitter working on forty meters. 2AU is getting out consistently better each month. 2AZ is very quiet. 2BV has moved. He is putting up a new stick. 2CT is busy with his business. 2DO is now an ORS and a consistent one. 2AG was selected for operator of the Arctic, VDM, this year. The Quebec Division is proud of him. He has had years of commercial and amateur experience. 2BT is using a "fiver" again. 2AM operates more frequently on a 75 meter wavelength.

Every station owner should improve the efficiency of his station and get it operating on twenty or forty meters. Both WNP and VDM will be on the short wavelengths this year and it is our duty to provide communication day or night.

2HV has been appointed Publicity Manager in the absence of 2BN, who is leaving on his annual trip across the "pond". 2HV has already done well by making a fine write-up of VDM.

The Vigilance Committee has been active. Members were able to show an irate "OW" BCL that the "QRM" was not from any "ham".

Special commendation is given 2CI, 2BN, and 2BE for regular attendance at the Wednesday night all-Canada ham-chew on 120 meters.

Traffic: 2AU, 30; 2AZ, 1; 2CI, 7; 2CG, 10; 2HV, 5; 2BN, 17; 2AX, 15; 2BE, 21; 2FI, 3.

WINNIPEG DIVISION
W. R. Pottle, Mgr.

ACTIVITY in this Division is decidedly on the increase. Great stuff, keep it up! Although the QRN was bad, the Prairie stations handled a good share of the Trans-Canadian messages. Don't forget, all stations are in on the Wednesday night parties on 120 meters. Let's have a 100% attendance. 4AA is our new Publicity Manager. Give him your assistance. We are going to have a real Convention this year, and it's not too early to get things started. If you haven't heard about it, write the D.M. Let's have everybody working.

4FA of Prince Albert is on the air occasionally and he is QSO Alberta using one 201-A. 4AV is using two "fivers" on 40 meters. 4FA is on with a 201-A but he will increase power by fall. 4FC has pursuaded his "fivers" to deliver the goods a bit better now. Two new stations are expected on the air soon.

4AJ since returning to Regina has surely stirred up the ether. One of the good things they taught him down east "was to wield a wicked key". 4BR and 4FV are rebuilding.

4DR at Corinne and 4IQ at Wilcox are on consistently, on low power. 4GH has been off the air owing to sickness in the family. 4GH is our new D.S. 4IX is experimenting with the lower wave lengths. 4CB is trying to get going on five meters. If anyone hears his signals will they please drop him a postal card. At the present time 4CB and 4AO are handling the weekly broadcast work.

Thanks very much for the reports, gang. Don't forget that the two Bills on either side of us (3NI and 4GP) can sling a wicked line. Don't let 'em put one over on us. Keep up the good work and turn in good peppy reports. D.M.

Traffic Report: 4AV, 4; 4AW, 15; 4DY, 12; 4AO, 10; 4ER, 12.

Report to Canadian Hams on I. A. R. U. Conference

By Wm. Coats Borrett, c1DD

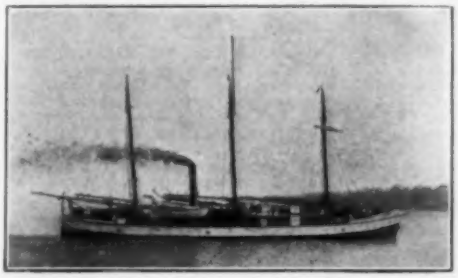
THE I.A.R.U. is now an established fact. It is the goal to which hams in all parts of the world have been aiming at for considerable time and it is with great pride that the writer looks back upon the honorable part he was allowed to play in forming the I.A.R.U. by being the Canadian representative. It will also be a matter of pride to all Canadian hams to know that Canada was on several occasions referred to in the convention as an example to the rest of the world of how all the hams of one country could play the game and work in perfect harmony with our brother hams of the U.S., as part of the great A.R.R.L., which is looked upon as the peer of amateur radio organizations in the world. In fact one of the biggest arguments in favor of an I.A.R.U. was the splendid harmony existing in North America between the United States, Canada and Newfoundland in radio matters, and the hams from all over the world expressed themselves in no uncertain terms that they wanted the I.A.R.U. formed along similar lines.

To Mr. Hiram Percy Maxim must go the greatest share of credit for the success of the Union. Mr. Maxim is looked up to by the hams from all over the world as the one man who can lead the I.A.R.U. to success and the ovations which he received from the general congress on several occasions after his many speeches were outstanding among the many happenings.

Much argument occurred during the first sessions as to who was to be considered an amateur; this was settled by Mr. Maxim getting on his feet and declaring that the U.S.A. and Canada had sent delegates to help in the formation of a Union between those interested in *two-way telegraphic communication.* This was greeted with riotous applause by the hams present from all over the world, especially the French hams, and the word "ham" is now thoroughly understood in many countries.

The congress was made up of "hams", B. C. L.'s, and Jurists. It took about two days to find out what class the different people present represented. As soon as this was discovered things got under way. The congress was divided into five sub-committees and the different subjects were given the committees to discuss and settle and report to the main conference, which would then discuss the report. A method most strange to the writer and in fact to all the American delegates was then carried out to dispense with the reports. After numerous people, B.C.L., ham and Jurist, had expressed their views on the report, the chairman called upon the members of the sub-committee to rise and vote on the report which they had brought in. This meant that any country that did not have a representative on the sub-committee did not get a vote. The representative from Canada having suspected that some peculiar method might be used, and not being able to divide himself so that he could be on five sub-committees at once. luckily thought of getting three English hams and Mr. Reid of Newfoundland to represent Canada in the four sub-committees which he could not attend (all sub-committees met at once) and gave them instructions on how to vote. The three English hams who, with Mr. Reid of St. Johns, represented Canada in sub-committee work and to whom we owe great thanks (as they on one occasion worked all night in addition to the day session) were: Sub-committee on Wavelengths to be used for International Telegraphic Tests, Mr. A. R. Ogston, g2UI; Sub-committee on arranging

International Amateur Tests, Mr. L. Royle, g2WJ; Sub-committee on International Abbreviations and Intermediate Call Signs for Nations, Mr. Basil Hodson, 2nd Op at g2WJ; Sub-committee on Auxiliary Language, Mr. Royal Reid, c8AR; the writer remained on the sub-committee for the formation of the International Amateur Radio Union, as this was the one committee where the future of wide-world amateur radio would be decided, and although things did not go all our way in some of



VDM, THE C.G.S. ARCTIC.

the other sub-committees, the Union was formed as all hams would desire it: of, by and for the ham. It is impossible in this report to go into all the details and at some future date a full report will be issued giving reports of the sub-committees.

In addition to the executive council, each country having twenty-five or more members of the I.A.R.U. will have a director on the board of directors. Mr. A. H. K. Russell of Toronto and Mr. Maxim by virtue of their positions of Canadian General Manager and President of the A.R.R.L. respectively, are directors for the Canadian and U.S. Sections of the I.A.R.U.

In conclusion the writer wishes to thank the Canadian members of the A.R.R.L. for having supported and selected him to represent them at the I.A.R.U. conference. I feel sure that we have done a good job and that you all will put your shoulders to the wheel and join the I.A.R.U. and help us show the whole world that the transmitting hams of the world are as one. We have formed a minature League of Nations and with *every ham delegate present voting unanimously for the whole constitution.* I am sure that you will agree with me that when twenty-five representatives from different countries in the world can get together and vote unanimously for the I.A.R.U. that we have accomplished something that others in different lines of endeavor could well afford to copy.

The C.G.S. "Arctic" Sails Again

The C.G.S. Arctic is off again on her annual trip to the north, and by the time these lines are being read we shall probably have heard the 480 cycle note of VDM on the air, as she expects to sail from Quebec the first of July, although unfavorable ice conditions in the north may delay sailing a few days.

Commander C. P. Edwards, Director of Canadian Radio, who has charge of the installation of the radio equipment on VDM advises that the following equipment is being carried this year, and asks the cooperation of all amateurs in making this trip a real success from a radio standpoint, and in collecting data on the various wavelengths which will be used. Commander Edwards urges that all messages which cannot be handled direct to the addressee by radio be promptly mailed to their destination. Official messages may be telegraphed collect *only* if this is distinctly stated in the preamble.

The same equipment which was used last year will be carried for communication on 120 meters (the special trans-Canadian wavelength) and also on the 80-meter band. New sets are being installed to work on the 20- and 40-meter bands, a special antenna system being erected for these wave lengths. Tests with KDKA's short wave transmitter will be carried out on 49 meters. The exact wavelengths and schedule of operation is not available at this time, but will be published later. If you

ROBERT M. FOSTER, c2AC, OPERATOR OF VDM

are interested in the long wavelengths, listen for VDM's 2 K.W. spark on 600 meters, and her C.W. set on 2,100 meters.

"Bobbie" Foster who is to be the operator on this trip operates station 2AC at Montreal. Bobbie is an old timer, being a ham from 1917. He started a station right after the war and attended the Marconi school in 1921. After getting his Government Certificate as a First Class

(Concluded on page 68)

Calls Heard

1PO, Navy Yard, Boston, Mass.
(All on 40 meters—Det Only—Without Antenna)

U.S.: 3apv, 3bz, 3ckl, 3io, 4jr, 4rm, 4ua, 5aur, 5hi, 5of, 5ph, 5ls, 5ux, 6ae, 8abm, 8afd, 8afm, 8ajm, 8aks, 8alc, 8alf, 8alr, 8aly, 8apo, 8apw, 8aul, 8ave, 8awv, 8ayn, 8ayy, 8baf, 8bf, 8bgn, 8bhm, 8bjg, 8bkx, 8bpl, 8bqn, 8brc, 8btf, 8bwb, 8bws, 8bye, 8byy, 8bzk, 8caz, 8cbp, 8cdr, 8cdv, 8chk, 8cql, 8dae, 8dai, 8deb, 8dgp, 8dkw, 8do, 8dkr, 8ej, 8er, 8ex, 8fu, 8gu, 8gz, 8jj, 8kw, 8no, 8sf, 8to, 8uk, 8xav, 8ze, 9aaj, 9acp, 9afz, 9age, 9agj, 9amj, 9ayp, 9baa, 9bbe, 9bbj, 9bbu, 9bby, 9bcd, 9bdu, 9bht, 9bjj, 9bmv, 9bmx, 9bou, 9bpb, 9bqk, 9bme, 9brx, 9ckb, 9csg, 9cuo, 9cvr, 9cxx, 9cyx, 9dbz, 9dav, 9dex, 9dfj, 9dfb, 9dlt, 9dp, 9dpj, 9dwz, 9dum, 9dzf, 9eja, 9ejy, 9elb, 9ek, 9es, 9gh, 9li, 9kd, 9kh, 9mp, 9mq, 9nv, 9og, 9om, 9sn, 9sr. Others: g2kf, naj, nal, wiz, nkf, ln (May 15), nrrl. Canada. 1an, 1ar, 1dd, 2ah, 2ax, 2be, 3afp, 3co, 3ds, 3ia, 3iu, 3en, 3qs, 3tv, 3vh, 9al. All crds QSLd.

2ADU, Rutherford, N.J.

4cr, 4dx, 4ez, 4je, 4me, °4rl°, 5aai, 5atx, 5aur, 5hi, 5kn, 5ls, 5ph, 5uk, 6agk, 6awt, 6bh, 6bve, 6cgo, 6cgw, 6chl, 6clp, 6cmp, 6cto, 6cub, 6uf, 6vw, 6zac, 7gb, 9ado, 9apn, 9ayb, 9bby, 9bga, 9bjl, 9bkr, 9bmx, 9bsb, 9chu, 9cpo, 9dct, 9dge, 9dka, 9dms, 9dpj, 9dpx, 9duh, 9dzf, 9eet, 9ejy, 9elb, 9hw, 9kd, 9ny. C.: 1ar. M.: 1b. G.: 2kf, 2wj, 6ym. A.: 2bk, 2ds. Z.: 2ac, 2ae, kfuh, nerk, nkf, nqw, npg, nrrl, nss.

2AEY, Elizabeth, N.J.

5aai, 5aaq, 5acl, 5afb, 5afu, 5ail, 5ajj, 5akn, 5aque, 5aqf, 5aqw, 5asz, 5ba, 5bl, 5ch, 5cn, 5co, 5ct, 5ed, 5fm, 5hi, 5jf, 5ku, 5lh, 5lr, 5ox, 5rq, 5sd, 5uv, 5zai, 6aak, 6abm, 6aea, 6afh, 6afq, 6aky, 6alv, 6ame, 6anb, 6anw, 6aoi, 6axl, 6baw, 6bbo, 6bbq, 6bhz, 6bik, 6bir, 6bjl, 6bjn, 6bmo, 6bmr, 6bmu, 6bph, 6bve, 6byk, 6cne, 6cah, 6caq, 6ccg, 6ccw, 6ceu, 6cga, 6cgo, 6chn, 6chu, 6clu, 6cmg, 6cms, 6cqu, 6cvs, 6cvz, 6eo, 6ew, 6fy, 6jd, 6jw, 6jx, 6mp, 6mx, 6no, 6nx, 6oi, 6xi, 6zh, 7gb, 7gj, 7gr, 7gq, 7kf, 7ls, 7mf, 7si, 7uj, England: 2ce°, 2dx, 2bz, 2fm, 2fu, 2kf, 2lz, 2nb, 2od, 2sh, 2wj, 5bv, 5ma, 5nn, 5pu, 5pz, 5rz, 5uq, 6gh, 6nf, 6nh, 6np, 6ry, 6uv.

5ATT, Corpus Christi, Texas

1aan, 1af, 1aff, 1apc, 1awy, 1bnl, 1ee, 1cbb, 1drk, 1ga, 1ka, 1kc, 1lx, 1ns, 1nw, 1une, 1xu, 1za, 2acs, 2adk, 2ado, 2amn, 2bka, 2br, 2ec, 2ceq, 2cj, 2gk, 2ke, 2pz, 2xk, 3cdn, 3jw, 3qre, 3ta, 3tu, 3xan, 4aa, 4ai, 4am, 4bc, 4bm, 4dt, 4dx, 4ea, 4er, 4fm, 4hp, 4ig, 4iu, 4jd, 4ku, 4mi, 4oa, 4oq, 4pt, 4qf, 4rm, 4sl, 4sx, 4ta, 4xe, 6bur, 6cmu, 6cso, 6csa, 6cwl, 6dah, 6mi, 6no, 6nx, 6qh, 6tx, 6yb, 6ym, 6xg, 8af, 8afn, 8app, 8aqe, 8avl, 8ba, 8bqi, 8brc, 8btf, 8zk, 8chk, 8cnl, 8cuk, 8cy, 8cyi, 8dsa, 8dai, 8do, 8cq, 8er, 8lr, 8rdi, 8rj, 8uk, 9abo, 9abw, 9ado, 9af, 9agm, 9aon, 9ayb, 9apn, 9ato, 9bar, 9bbe, 9ben, 9bhn, 9bir, 9bjp, 9blb, 9bms, 9bot, 9brk, 9cce, 9cda, 9ce, 9cea, 9cjt, 9cku, 9cro, 9cvl, 9cvn, 9db, 9dez, 9ded, 9dge, 9dk, 9dkl, 9dmj, 9nb, 9dot, 9djp, 9dpx, 9dqr, 9dtm, 9duc, 9dv, 9dxn, 9ebi, 9eez, 9eej, 9ek, 9elb, 9es, 9hp, 9kh, 9kix, 9mm, 9na, 9nn, 9ot, 9pb, 9tg, 9tih, 9xy, 9zk, c2bg, c9al, clar, nrrl, naj, nkf, wgh.

6BJX, Los Angeles, Calif.

1af, 1asy, 1atj, 1cu, 1xam, 1xav, 2acs, 2adk, 2bgi, 2bqc, 2br, 2cgj, 2cmm, 2cnk, 2kf, 2kx, 2rk, 2wc, 2xbf, 3alx, 3apv, 3auv, 3bjp, 3bta, 3cjn, 3np, 3zo, 4fg, 4gw, 4jy, 4si, 6asr, 8alf, 8apw, 8ase, 8ced, 8deb, 8dif, 8gz, 8ln, 8pl, 8uk, 8ze, a2bk, a3bd, a5bg, c3auc, c4ao, c4io, c9al, jlaa, z2ac, z4ag, hva.

8AHM, Ypsilanti, Mich.

6aak, 6ajf, 6ajq, 6ajr, 6anw, 6ar, 6arw, 6baq, 6bes, 6bgc, 6bhz, 6bjd, 6bme, 6bmo, 6bel, 6btm, 6bwd, 6bwi, 6cct, 6ccv, 6chs, 6clv, 6cov, 6cmd, 6crr, 6cso, 6clx, 6dai, 6daj, 6das, 6dax, 6ew, 6fu, 6kb, 6rn, 6rm, 6rw, 6uo. Canadian: 4dy, 5af, 5bf, 5bl. Mexican: 9a, 1k, 1g, bx. Spanish. 1aa, z4ag. Danish: 7ss, f8cs.

8BDG, 102 Center Ave., Schuylkill Haven, Penna.

4du, 4dx, 4fb, 4ft, 4lz, 4jr, 4me, 4oa, 4rl, 4ry, 4sa, 4si, 4tv, 4ux, 4vm, 4xe, 5anh, 5aaj, 5aej, 5aeq, 5afn, 5aij, 5alu, 5aqy, 5asz, 5ath, 5atv, 5aur, 5eu, 5cn, 5er, 5ka, 5nj, 5ph, 5qj, 5vf, 5vl, 5vj, 5vs, 5za, 5zm, 5zo, 6age, 6ahp, 6bjd, 6bjj, 6bmw, 6ban, 6cgo, 6cgw, 6cir, 6crj, 6csw, 6cto, 6cub, 6cvw, 6hm, 6hu, 6im, 6ne, 6no, 6oi, 6qd, 6rz, 6ut, 6vc, 7gb, 7ya, 9anq, 9adg, 9ado, 9adr, 9alc, 9ane, 9amh, 9amo, 9aqf, 9aws, 9axq, 9aye, 9baa, 9bbe, 9bcd, 9bcn, 9bdh, 9bdu, 9bdw, 9bib, 9bir, 9bjb, 9blb, 9bmc, 9bmx, 9bnf, 9bou, 9bqk, 9btd, 9btk, 9bvh, 9bxj, 9cag, 9cap, 9cba, 9cbq, 9ccl, 9cdj, 9cfi, 9cjl, 9cld, 9cpi, 9ctg, 9cul, 9cuo, 9cvg, 9cwn, 9cxk, 9cxw, 9cyk, 9cyx, 9dat, 9db, 9dbc, 9dbz, 9dcb, 9dez, 9dfh, 9dit, 9dka, 9dpl, 9dpn, 9dpr, 9dps, 9dpx, 9dum, 9dve, 9dwz, 9dxi, 9dxq, 9dzf, 9dzw, 9eak, 9eet, 9ein, 9eht, 9ejy, 9ek, 9ekk, 9eky, 9fg, 9gt, 9hn, 9hw, 9kd, 9mp, 9nv, 9ny, 9om, 9pn, 9qd, 9rg, 9rs, 9ry, 9sr, 9av, 9ud, 9xax, 9xi, 9xn, 9xw, 9zt. Foreign: f8qq, f8sm, g2ac, g2kf, g2vw, g2wj, g6ym, m1b, m1af, ber, c5hs, pow7 nal, nkf, ngx, nerk, wiz.

8ZE, 8GX, Oberlin, Ohio

U.S.A.: 6agk, 6aji, 6alj, 6ahp, 6awt, 6bjd, 6bsc, 6bur, 6cgo, 6cgw, 6cig, 6cix, 6clr, 6css, 6cto, 6ee, 6jl, 6lj, 6kb, 6no, 6oi, 6ts, 6ui, 6ur, 6ut, 6xag, 7abb, 7gb, 7mf, 7pz. Foreign: a2bk, a2cm, a2ds, c2ax, c4cr, g2kf, g6ym, P.R. u4sa, z2ac, 5gos (QRA?) Special: nerk, nerk-1, nfv, nkf, npm, npg, nrrl, kfuh.

9MV, Story City, Iowa
150-200 Meters

1om, 2cdr, 2xi, 2akj, 3ol, 3bqh, 3og, 3cbx, 3wv, 3ph, 3bg, 4ar, 5auo, 5fh, 5pu, 5aql, 5bw, 5acu, 5bjj, 5ati, 8abd, 8afq, 8ajk, 8akk, 8aqc, 8azu, 8baa, 8bjt, 8bkw, 8bll, 8binm, 8bro, 8byv, 8cjv, 8ck, 8epj, 8erl, 8czz, 8dae, 8dfo, 8dgv, 8din, 8dmm, 8dms, 8dqv, 8dv, 8na, 8or, 8rj, 8ta, 8zz. Canadian: 2cb.

KDIS ex 6CGL, San Pedro to Columbia River

3wi, 4kl, 5ahr, 5ajn, 5pa, 5zai, 6avh, 6ckp, 6cct, 6crr, 7ah, 7ng, 7rl, 7sy, 7ob, 7uj, 8ded, 8ave, 8bqa, 8uk, 8zan, 8ba, 8ase, 8cjp, 8wz, 9arc, 9kh, 9brs, 9caw, 9cjt, 9dwx, 9epx, 9eld, 9dqu, 9ejy, 9eol, 9bbr, 9cag, 9ead, 9dge, 9dyy. Canadian: 4ij, 5bz, 5ba.

J. R. Mohler, U.S.S. Litchfield
San Francisco to Honolulu, April 15 to 27

1af, 1bep, 1adm, 2cjb, 3cjn, 3mq, 3pp, 4eq, 4ll, 4pb, 5afu, 5aiu, 5aph, 5apq, 5cg, 5gf, 5lo, 5mn, 5zai, 5zas, 6abs, 6aci, 6adb, 6ae, 6aea, 6aen, 6afg, 6agn, 6aht, 6ajg, 6ajr, 6akh, 6akz, 6alf, 6ams, 6anb, 6as, 6asv, 6avb, 6aw, 6baa, 6bac, 6bas, 6bav, 6bes, 6bgc, 6bge, 6bh, 6bhz, 6bin, 6bir, 6bjx, 6blp, 6bmo, 6bmw, 6bol, 6bom, 6boo, 6bsn, 6btl, 6bw, 6caq, 6car, 6ccb, 6cct, 6cdg, 6cej, 6ceq, 6cfi, 6cfs, 6cge, 6ch, 6chs, 6clp, 6cmd, 6cmu, 6cpe, ocpl, 6cqe, 6csl, 6crg, 6csn, 6ctm, 6ctx, 6cub, 6cuo, 6cw, 6cwp, 6cwv, 6cxh, 6dag, 6daj, 6dai, 6das, 6dbe, 6ea, 6ew, 6fu, 6fw, 6hj, 6ho, 6ht, 6jy, 6jw, 6kr, 6lp, 6mp, 6mt, 6ne, 6nf, 6op, 6rw, 6ry, 6ti, 6sb, 6ua, 6vb, 6vc, 6vr, 6wl, 6xg, 7aa, 7af, 7afb, 7afo, 7ag, 7agx, 7alb, 7ald, 7apo, 7ao, 7ef, 7es, 7cu, 7cy, 7de, 7df, 7dt, 7eo, 7gj, 7gm, 7gr, 7gy, 7jm, 7kf, 7lh, 7ly, 7nh, 7ob, 7oo, 7pz, 7qu, 7rq, 7sb, 7sl, 7sn, 7sm, 7sy, 7uj, 7uq, 7vn, 7vu, 7vq, 7wu, 7yk, 8ah, 8agw, 8ba, (86a?), 8cjp, 8cuk, 8doo, 8xl, 9aab, 9afv, 9afo, 9atu, 9axq, 9baa, 9bau, 9bef, 9bff, 9bic, 9bma, 9bof, 9bpb, 9bpn, 8bpy, 9bse, 9caw, 9clj, 9enx, 9epm, 9er, 9etw, 9etx, 9evn, 9eyd, 9dex, 9ded, 9del, 9dge,

9clc, 9dum, 9dxy, 9eb, 9eez, 9ek, 9mf, 9og. Can.: 4er, 4gt, 4io, 5af, 5bm, 5ba, 5cu, 5ds, 5gt, 5hb. Janan: aa. Hawaii. 6ceu. Navel: nerk1, nfv, nkf, npg, nqg, nrrl. Commercial es Broadcast: ndka, kel, kio, wgh. New Zealand: 2ae.

ss. Yorba Linda Between Long. 15 Degrees West and 26 Degrees West, 75-85 Meters

1as, 1ch, 1eo, 1ex, 1dd, 1kl, 1lx, 1my, 1pf, 1ql, 1sk, 1vk 1wl, 1xm, 1xu, 1zd, 1zt, 1zw, 1aso, 1aap, 1adb, 1afc, 1agc, 1agq, 1air, 1ajg, 1ams, 1ary, 1atv, 1auc, 1awy, 1axz, 1axn, 1bdn, 1bep, 1bgc, 1bvb, 1cln, 1cpc, 2ch, 2bc, 2bo, 2bw, 2by, 2cq 2jl, 2kx, 2ms, 2tr, 2wz, 2zb, 2zv, 2abd, 2afc, 2afn, 2agb, 2aif, 2bbx, 2bkr, 2blm, 2brc, 2byg, 2bzj, 2cez, 2cpd, 2crp, 2cty, 2cvj, 2xaa, 2xbb, 3aw, 3ds, 3fi, 3hd, 3kg, 3nf, 3pf, 3ql, 3sn, 3tr, 3vx, 3zm, 3zo, 3zw, 3acr, 3adt, 3aea, 3bma, 3bnu, 3bqp, 3btu, 3bvp, 3cgc, 3chh, 3cjn, 4ak, 4ax, 4ch, 4dt, 4ea, 4eq, 4ez, 4iu, 4je, 4jl, 4mi, 4pt, 4qf, 4si, 4vq, 4xe, 5ac, 5amh, 5uk, 5vv, 8cl, 8ef, 8jq, 8uf, 8uk, 8abs, 8afq, 8apr, 8aul, 8bbi, 8bbp, 8boa, 8bsf, 8bzt, 8bzu, 8dfn, 8dnb, 8doo, 8drs, 9hp, 9ek, 9qr, 9zu, 9zw, 9aek, 9apy, 9cbs, 9cjp, 9ckr, 9deb, 9dpj, 9dqr, 9dtt, 9duc, 9eji, c1do, c1eb, af2, v2, nkf, nfv, nerk1, kfkx, kdka.

Under 40 Meters April 19, 20, 21, Longitude 26 W. to 42 W.

1an, 1uj, 1xz, 1ckp, 2bee, 3ca, 9al, 9xi, 9xn, 9aud, 9bmf, naj.

Under 40 Meters April 22, 23, 24, Longitude 26 W. to 15 W.

1pl 2fz, 2gx, 2qh, 2awf, 2box, 5nj, uf8yor.

L. O. Doran, ss. West Jester, Yokohama to Chosen (Korea)

U.S.: 6akw, 6app, 6asr, 6bbq, 6bjx, 6cmu, 6cqe, 6dao, 6kb, 6km, 6no, 6nx, 6oi, 6ur, 7ao, 7uj, NQG. Australian: 2bk, 2yi. Canadian: 5ba, 5bz. New Zealand: 2ac, 4ak. Indo China: hva. Janan. jsda. Philippines: nirx. Unknown: 86a. Commercial: kel, kio.

Harry Kidder, U.S.S. Pope, Manilla, P.I.

5afu, 5ea, 6akw, 6apw, 6bjx, 6bpf, 6bur, 6cmg, 6cto, 6cur, 6eb, 6en, 6eo, 6ew, 6nx, 6of, 6oi, 6rw, 6vc, 6zbt, 7ij, 7lr, 9ado, 9cfi, ane, hva, hvn, kel, ket, nirx, npo, npg, nung, pkh. Aust.: 2ay, 2bk, 2em, 2ds, 2yi, 2yg, 5ad. N.Z.: 2ac.

b4RS, Verviers, Belgium

1gv, 1cmp, 1mo, 1ana, 1kc, 1ar, 1ma, 1am, 1nl, 1uz, 1zt, 1od, 1ak, 1rln, 1rb, 1nnc, 1cee, 1rbu, 1cak, 1lco, 1xam, 1qc, 1pu, 1ajv, 1afn, 1ev, 1xb, 2ck, 2jc, 2gk, 2jr, 2wt, 2od, 2apy, 2hs, 2rk, 2ree, 2wjc, 2wc, 2nm, 2cns, 2lm, 2klr, 2pz, 2cj, 2ccg, 2cpd, 2cxy, 2apm, 2blm, 2be, 3tc, 3ke, 3te, 3mp, 3tz, 3ue, 3atr, 3aah, 3mk, 3ui, 3hj, 2mi, 4iar, 4imi, 4ot, 4la, 4ai, 4nc, 4ht, 4ij, 4gk, 4ku, 5ot, 5not, 5uk, 5tk, 5cd, 5kk, 5ml, 5er, 6mi, 6ar, 6gg, 7ar, 7ym, 7tfm, 7ic, 8ke, 8cj, 8acm, 8cy, 8wc, 8pk, 8ke, 8tr, 8dgl. 9ab, 9nk, 9iw, 9amt, 9wgv. Canadian: 1ar, 1ae, 1ad, 1ak, 2ks, 2ek, 2lm, 2nk, 2od. Mexican. 1aa. Cuban: 2lr.

Swedish SMWF, G. Planthaber, Bondegatan 64 A, Stockholm, Sweden

20 and 40 meters: 1aac, 1aci, 1af, 1ain, 1aku, 1amd, 1anq, 1bcr, 1bea, 1bhm, 1boq, 1cak, 1cki, 1ckp, 1cmp, 1cmx, 1cri, 1er, 1hn, 1ii, 1kc, 1oj, 1ow, 1rr, 1xam, 1yb, 1za, 1zs, 2afn, 2agu, 2bee, 2bgi, 2bkr, 2br, 2ctq, 2gx, 2qh, 2ud, 2zo, 2zv, 4nu, 4rd, 4ry, 4sa, 8apv, 8dem, ber. Canadian: 1ar, 1dh. Qrk smwf on 38 es 49 meters?

g2SW, Birkdale, England

1aap, 1aaw, 1am, 1ar, 1abp, 1adk, 1af, 1aft, 1ag, 1aid, 1ajg, 1ajo, 1alw, 1ana, 1aqm, 1ary, 1at, 1atj, 1aur, 1avg, 1awp, 1aww, 1awy, 1axy, 1bcr, 1bdb, 1bdh, 1bdx, 1ber, 1bes, 1bfq, 1bhm, 1bkr, 1bnt, 1boa, 1bv, 1bw, 1bwx, 1byu, 1bxp, 1cf, 1cmp, 1cmx, 1cri, 1ex, 1da, 1dcq, 1dd, 1dj, 1dx, 1er, 1gs, 1gst, 1ii, 1js, 1mu, 1nk, 1nr, 1pc, 1pf, 1pl, 1py, 1qv, 1rb, 1rd, 1rr, 1sf, 1sk, 1sw, 1vr, 1wl, 1wp, 1xu, 1xz, 1ze, 2abt, 2acf. 2ad, 2amg, 2ax, 2bgw, 2bio, 2bm, 2bqw, 2br, 2bre, 2bw, 2by, 2cfk, 2chg, 2cnk, 2con, 2cpd, 2cub, 2cvf, 2cvj, 2cxl, 2cxy, 2kgj, 2kpd, 2ld, 2mu, 2rmf, 2tp, 2wr, 2xam, 2xv, 2yq, 3adq, 3aew, 3ahp, 3am, 3at, 3bco, 3bmn, 3ca, 3cbl, 3chg, 3cis, 3clv, 3dh, 3hg, 3hh, 3hq, 3kp, 3lg, 3lw, 3pc, 3sf, 3tk, 3xe, 4by 4ea, 4it, 4sa, 4tj, 4xe, 5lh, 5pu, 6zua, 7gn, 8aly, 8bau, 8bhz, 8cba, 8cbp, 8ccy, 8chk, 8dme, 8hsd, 8jbl, 8ks, 8pk, 9xav. Canadian: 2cc. Various: a4aa, wjs, nerk1, wir, 1okz, wrp. Qrk g-2sw?

D. Lavin, The Old House, Sonning, England 20 Meter Band

1abf, 1al, 1am, 1ana, 1asf, 1ban, 1ccx, 1cmx, 1cpk, 1hen, 1hn, 1pl, 1rd, 1nf, 1sw, 1te, 1wr, 1xu, 1ybp, 1zad, 2bq, 2zv, 4du, 4aa, 4tv, 4uk, 6age, 8avl, 8bu, 8by, 8gu, 8gx, 8nb, 8tg, 8to, 9cml, 9ek, 9xax, m1b, c1ar, c1rn, nkf, ncf, npl, nba.

F. Charman, 76 Salisbury St., Bedford, England

American: 1aae, 1aaj, 1aan, 1aap, 1abp, 1acf, 1add, 1adm, 1aew, 1af, 1afk, 1afn, 1ajg, 1ajx, 1alw, 1aly, 1ama, 1amf, 1ams, 1amx, 1aos, 1aos, 1aou, 1ape, 1apk, 1aqm, 1ar, 1are, 1ary, 1as, 1asu, 1ate, 1atq, 1aty, 1aur, 1avf, 1awl, 1awv, 1awy, 1axa, 1axi, 1bcc, 1bcu, 1bdp, 1bdu, 1bdx, 1bhm, 1bjl, 1bk, 1bkr, 1blx, 1bpp, 1bqi, 1bqk, 1bqq, 1bvl, 1bwx, 1bxl, 1bxp, 1cab, 1cak, 1cb, 1cbb, 1ck, 1cme, 1cmx, 1cpc, 1cre, 1cri, 1cx, 1cxg, 1cwv, 1da, 1dd, 1dq, 1ee, 1ef, 1er, 1hn, 1ii, 1ka, 1kl, 1ma, 1mkj, 1mei, 1my, 1or, 1pl, 1pm, 1rd, 1rf, 1rr, 1sw, 1tf, 1tt, 1vd, 1wl, 1wr, 1xo, 1xu, 1xs, 1yb, 1yd, 1yk, 1zt, 1zu, 2aan, 2any, 2acf, 2afg, 2afp, 2agw, 2am, 2ama, 2aod, 2aqb, 2avg, 2awk, 2axf, 2az, 2bck, 2bcn, 2bd, 2bdm, 2bee, 2bka, 2bkr, 2blm, 2blp, 2bm, 2bnz, 2bqu, 2brb, 2bso, 2bum, 2bur, 2bw, 2bwa, 2by, 2cag, 2cbg, 2ced, 2cel, 2cft, 2cg, 2cgj, 2cgk, 2cjb, 2cjs, 2cjx, 2ck, 2cla, 2clg, 2cmj, 2cns, 2cp, 2cpd, 2cps, 2cr, 2crb, 2crg, 2ctq, 2cty, 2cub, 2cuj, 2cvf, 2cvj, 2cwj, 2cxw, 2cxy, 2cyu, 2cyw, 2dd, 2ds, 2fu, 2fz, 2gk, 2hb, 2je, 2lr, 2ls, 2mu, 2nr, 2pz, 2qh, 2rb, 2rk, 2rm, 2ud, 2wb, 2wr, 2xv, 3ab, 3abh, 3aca, 3acu, 3adb, 3aew, 3afs, 3aha, 3ajb, 3apv, 3as, 3auk, 3av, 3avk, 3bam, 3bau, 3bbb, 3bcg, 3bct, 3bjp, 3bmn, 3bms, 3bnf, 3bnu, 3bpm, 3bqp, 3bt, 3bta, 3btl, 3btq, 3buv, 3buy, 3bwt, 3cc, 3cdv, 3chg, 3cis, 3cjn, 3ck, 3ckj, 3hg, 3hh, 3hj, 3hq, 3jo, 3jw, 3kq, 3lw, 3mb, 3mf, 3ms, 3oe, 3oq, 3qt, 3sm, 3sn, 3te, 3tf, 3tp, 3ua, 3ud, 3ue, 3uw, 3vw, 3vx, 3wo, 3xm, 3xx, 3zo, 3zw, 4au, 4ch, 4dm, 4du, 4dv, 4eq, 4er, 4fm, 4iu, 4jr, 4jy, 4kq, 4kt, 4pt, 4qf, 4sa, 4te, 4tf, 4tj, 4tv, 4ue, 5agn, 5nic, 5ajm, 5cu, 5ka, 5nj, 5nq, 5ox, 7mz, 8abg, 8abs, 8acm, 8acy, 8adg, 8agb, 8ago, 8aly, 8apn, 8aul, 8ave, 8avd, 8awj, 8bau, 8bch, 8ben, 8bgg, 8bgv, 8bit, 8bku, 8boa, 8bpb, 8bq, 8bza, 8bzt, 8caj, 8cer, 8ces, 8cx, 8cz, 8dgl, 8dme, 8doo, 8drs, 8eb, 8eu, 8nb, 8pz, 8uf, 8xav, 8xe, 8zu, 9ax, 9bbe, 9bc, 9bmf, 9bpb, 9dp, 9dwx, 9elb, 9es, 9et, 9hp, 9oa, 9xax, nerk1, nkf, wjs. 20 meters: 1asf, 1avk, 1boq, 1ccx, 1ci, 1ckp, 1cmp, 1cmx, 1ow, 1pl, 1rd, 1sf, 1xam, 1zt, 1my, 3apv, 4sa, 8gz, 9xax. Canadian: 1ar, 1dd, 1dj, 1dq, 1eb, 1ed, 1ei, 2bg, 3ch, 2le, 3mv, 3nf, 3xf, 8eb. q2mk, m1x, m10t, a3bq, a2me, z4ag, z4aa, ch9tc.

"There is a Card for Everyone Who QSL's."

g2AWK, F. Thompson, 16 Stratford Grove, Newcastle-on-Tyne, England, 75-85 Meters

1aap, 1aoa, 1axa, 1or, 2agb, 2brc, 3ab, 3bwl, 3cd, 3hk, 4tj, 4ua, 4yz, 5aef, 5akn, 5akq, 5bch, 5mn, 5ox, 6amo, 6arx, 6awt, 6bbv, 6bcl, 6bcj, 6cbj, 6cto, 6ew, 6ts, 7ft, 8aa, 8cpy, 8cyi, 9apy, 9bfl, 9bwp, 9bxg, 9cea, 9cjs, 9eak, 9efz, 9ehm, 9ell, 9es, 9vz. Canadian: 1ed, 9al. Tne QSL. A card for a card.

6NF, 49 Thornlaw Road, West Norwood, London, England. 75-85 Meters.

1ax, 1af, 1abp, 1afc, 1alg, 1apk, 1aug, 1aac. 1ajg, 1alk, 1aea, 1azr, 1aja, 1ana, 1aur, 1ary, 1atj, 1bg, 1bv, 1bal, 1bbe, 1bec, 1bdc. 1bdx, 1bgy, 1bhm, 1bis, 1bly, 1boa, 1bzg, 1bzp, 1ck, 1ckd, 1clu, 1elg, 1eme, 1cbg, 1cqz, 1cre, 1cw, 1cwe, 1da, 1ef, 1ez, 1hn, 1jk, 1ka, 1kc, 1lw. 1oa, 1pa, 1pd, 1py, 1se, 1sz, 1wb, 1wl, 1xu, 1xz, 1xam, 1xav, 1zs, 2ad, 2ax, 2aay, 2afp, 2anh, 2auy, 2axy, 2bb, 2bg, 2bn, 2br, 2bz, 2bco, 2bic, 2bko, 2bqm, 2bzj, 2cbg, 2cjs, 2clg, 2ens, 2cpz, 2cqs, 2cvu, 2cws, 2cxy, 2cyw, 2dn, 2ds, 2kg, 2kx, 2kcy, 2ld, 2mc, 2mh, 2mu, 2qh, 2rk. 2ud, 2xy, 3ab, 3ajd, 3adb, 3aeh, 3alq, 3ape, 3bgz, 3bng, 3bnu, 3bob, 3bof, 3bqo, 3bas, 3bav, 3btm, 3cac, 3edg, 3edi, 3cjn, 3hg. 3iy, 3jo, 3jr, 3mf, 3ms, 3og, 3pk, 3ud, 3sg, 3tj, 3wb, 3xf, 3xv, 3yo, 3yz, 4aj, 4du, 4eh, 4fm, 4gw, 4ke, 4kl. 5cn, 5gs, 5lh, 5ph. 5su, 5se, 5uk, 5hn, 5zas. 6cmd, 6qv, 7gz, 8adz, 8abn, 8adg, 8bc, 8cnw, 8cyi, 8dme, 8dnf, 8cvh, 8ks, 8pr, 8pl, 8uf, 8wk, 8xz, 9bcj, 9bpb, 9byn, 9dqu, 9erd. Canadian: 1eb, 3ab, 3afp.

Others: Z4aa, 4ag, A3bq, cb8, Ch9tc, wjs, vdm. Glad to QSL. QRK G6 NF?

g6QB, L. H. Thomas, London, England.

1aao, 1abs, 1abu, 1acb, 1aez, 1akz, 1alk, 1alw, 1amf, 1apk, 1aqm, 1ary, 1awe, 1axn, 1ayp, 1azr, 1ban, 1bat, 1bcr, 1bcu, 1bdx, 1bis, 1bg, 1bnt, 1bun, 1buo, 1bwj, 1bwx, 1bz, 1cav, 1cbb, 1cc, 1eme, 1eri, 1cru, 1cx, 1ef, 1fn, 1ii, 1it, 1je, 1jt, 1ka, 1kl, 1ky, 1nd, 1qv, 1rp, 1tr, 1vk, 1xu, 1yd, 1ze, 1zl, 2aac, 2aan, 2abf, 2abt, 2aco, 2adj, 2adm, 2ahh, 2ajc, 2ajp, 2amj, 2aqh, 2arf, 2avu, 2big, 2bng, 2bqa, 2br, 2bq, 2buy, 2byk, 2cep, 2chk, 2cjb, 2cnk, 2cns, 2crp, 2ctq, 2cub, 2evj, 2dd, 2hs, 2ke, 2kf, 2le, 2sz, 2ud, 2zb, 3aak, 3abw, 3adv, 3aha, 3aic, 3avk, 3big, 3cbl, 3cfe, 3dh, 3hg, 3hh? 3in, 3lw, 3mb, 3oq, 3ot, 3ou (pse qsl), 3wn, 3xm, 4do, 4ft, 4my, 4pk, 4sb, 4tr, 4uk, 5ail, 5alr, 5bg, 5ca, 5ek, 5lh, 5ls, 5op, 5qy, 8ada, 8adg, 8avd, 8bcp, 8ben, 8bhj, 8bnh, 8bon, 8bzk, 8cbx, 8cer, 8ced, 8cuk, 8cyt, 8dke, 8do, 8er, 8lr, 8pl, 8rg, 8tt, 8wz, 9bcj, 9caa, 9ccm, 9cee, 9evs, 9dtk, 9dxm, 9es, 9zk, cldm, cleb, cled, c2ax, c2to, c3afp, c3bp, c3hh, wvp.

fSRLH, Calais, France.

1ar, 1aac, 1apk, 1ary, 1aaj, 1aza, 1af, 1axn, 1air, 1azr, 1am, 1bdi, 1bdh, 1bhm, 1bad, 1bgq, 1bdx, 1bre, 1cei, 1ckp, 1ckc, 1clg, 1cpe, 1cpv, 1cru, 1ex, 1cre, 1cex, 1cb, 1df, 1gso, 1hn, 1ii, 1ou, 1pl, 1py, 1rd, 1rr, 1ryq, 1wl, 1sw, 1vj, 1xam, 1xu, 1xz, 1xm, low, 2ahk, 2ag, 2agw, 2aww, 2ale, 2bqh, 2bac, 2bm, 2bw, 2by, 2bvh, 2cpa, 2cjg, 2ck, 2cc, 2cvf, 2ca, 2evs, 2cjb, 2cla, 2cjx, 2cya, 2cxw, 2cxy, 2cy, 2epd, 2cgi, 2crw, 2crp, 2em, 2eq, 2gk, 2ld, 2le, 2ll, 2lv, 2nnt, 2rk, 2wb, 2xk, 2xaf, 2xss, 3ad, 3aq, 3bg, 3cb, 3cdn, 3cjn, 3chg, 3hg, 3hh? 3m, 3lw, 3mb, 3oq, 3ot, 3ou (pse qsl), 4du, 4eh, 4eq, 4gw, 4oy, 4tj, 6gh, 7pm, 8aly, 8aib, 8ba, 8ixg, 8in, 8dhq, 8dme, 8kc, 8pq, 8xt, 9abi, 9arp, 9arr, 9dpr, 9dtk, 9dwi, 9elr, WGH, NKF, rCB8.

G. W. G. Benzie, 2BG, Udarband Post Office, Cachar, India. (350 miles N. E. Calcutta.)

American: 1aac, 1ana, 1bd, 1cmp, 2ax, 2brb, 2rk, 2xi, 2yi, 3adb, 3aec, 3bgi, 3ckl, 3jo, 4oa, 5cn, 5ls, 5mi, 6aao, 6ac, 6ahp, 6akw, 6ame, 6awk, 6awp, 6awt, 6bur, 6bve, 6bvw, 6cgo, 6chl, 6cix, 6cmp, 6cmu, 6cto, 6aqe, 6cy, 6ew, 6oi, 6pl, 6rn, 6ua, 9bhx, 9cxx, 9dmj, nqg. British: 2fm, 2kf, 2kt, 2kw, 2nm, 2od, 2sz, 2vs, 2wj, 2yt, 5nn, 5pu, 6nf, 6rd. Australian: 2bk, 2ds, 2yg, 2yi, 3bm, 3bq, 3db, 3ju. New Zealand: 1ao, 2ac. 2ap. 4aa, 4ag, 4ak. France: 8bf, 8ql. Holland: ogc, oll, onl, 3cn. Sweden: smxi, smxy. Finland: 2nm. Italy: 1mt. Canada: 5ba. Mespot: ghh. Argentine: cb8. Java: ane. Russia: rdw. French Indo-China: hva. Unknown: 8bo.

R. W. Mintrom, 62 Barton St., Woolston, Christchurch, New Zealand.

1af, 1gv, 1kc, 1ml, 1ow, 1yw, 1xg, 1all, 1aag, 1ajo, 1bos, 1bcr, 1bdh, 1cmp, 1xav, 2ag, 2er, 2le, 2rk, 2cg, 2brb, 2bsc, 2eqz, 2xq, 3aw, 3yo, 3ab, 3amh, 3auv, 3bnu, 3ccx, 4aa, 4ku, 4tj, 4io, 4dm, 5nj, 5ph, 5dw, 5mi, 5ox, 5uk, 5cn, 5in, 5bz, 5lu, 5qy, 5air, 5afn, 5ajj, 5acj, 5ail, 5aiu, 5alr, 5akn, 5aql, 5zav, 5zai, 6gt, 6lj, 6ur, 6pl, 6of, 6vo, 6eb, 6ne, 6fh, 6ao, 6rn, 6zp, 6oi, 6ts, 6ac, 6cc, 6ti, 6rv, 6bh, 6arb, 6aao, 6awp, 6avj, 6age, 6agk, 6ase, 6ahp, 6awt, 6afo, 6aan, 6adt, 6akw, 6ame, 6akz, 6aqd, 6ary, 6asv, 6ajl, 6aro, 6bra, 6bqr, 6bnu, 6bur, 6bqd, 6bqb, 6brf, 6bjj, 6bka, 6blw, 6bbv, 6buh, 6hep, 6bql, 6bmw, 6bes, 6bjx, 6cfz, 6cto, 6cqe, 6cae, 6clp, 6cej, 6cgs, 6chl, 6cjv, 6cgo, 6cmu, 6css, 6cmi, 6ckg, 6cek, 6cnl, 6cdt, 6cgw, 6cfs, 6cxx, 6cct, 6cjj, 6ccy, 6cbb, 6ctc, 6ctt, 6csw, 6cso, 6cub, 6cor, 6xax, 7fr, 7fd, 7gb, 7lq, 7ij, 7xm, 7dq, 7om, 7sf, 7ls, 7mf, 7qd, 7lh, 7cj, 7aim, 7afn, 7afo, 7abb, 8ah, 8gz, 8vq, 8hn, 8ba, 8dhw, 8cyi, 8bnh, 8bau, 9bm, 9bo, 9em, 9hk, 9zd, 9zt, 9xi, 9mm. 9zy, 9xe, 9ek, 9co, 9ddp, 9bxh, 9bji, 9eky, 9egh, 9dqu, 9bcj, 9dqa, 9efy, 9eht, 9elq, 9xax, 9dmj, 9cvo, 9cgn, 9dwx, 9csg, 9daw. Canadian: 1ar, 1dd, 3bp, 4cr, 5ba, 5go. British: 2od, 2nm. Mexican: bx, 1b. Chilian: 9tc. Porto Rican 4sa. Argentine: cb8, d1.

bz1AB, E. do Rio, Brazil.
40 Meters

American: 1aac, 1abf, 1af, 1aff, 1axn, 1bcr, 1emp, *1id*, 1ii, 1my, 1pm, 1ow, 1te. 1xam, 1xu, 1yb, 2aay, 2aey, 2cgi, 2chk, 2cpd, 2cso, 2em, 2gk, 2qh, 2rk, 2rm, 2ud, 2zv, 3fa, 5zas, 6cgw, 8aal, 8abs, 8brc, 8cer, 9aav, 9bht, 9dyu, 9xax (hrd on 20 mts.), 9zt. Canadian: 1ar. English: 2dx, 2kf, 2jf, 2nm, 5nn. New Zealand: 2ac. Porto Rico: 4sa. Bermuda: ber. French: 8sm, yz. Holland: onl, pel, nsf. South Africa: a4z. Argentine: a8, aa1, af1, af2, ah2, cb8, d1, ma1. Uruguay: fwx. Chile: 9tc, 2ld. Miscellaneous: wgh, nkf, pox, nerk1, b7, 2cg.

i1ER, Milano, Italy.
40 Meters

1adp, 1aff, 1aid, 1arh, 1ars, 1bcr, 1bnl, 1boq, 1bs, 1ccx, 1ck, 1cj, 1cu, 1ii, 1pm, 1ql, 1ra, 1rr, 1wr, 1zl, 2ac, 2aly, 2af, 2auv, 2bee, 2boa, 2cpa, 2ctf, 2ctq, 2em, 2gx, 3cpa, 3jw, 4dm, 4ua, 4tiu, 8ccr, 8ks, 8zg, 9dqu, 9xn.

EAR 1, Madrid, Spain.

1ary, 1xu, 1cab, 1dd, 1cak, 1atk, 1cmp, 1bes, 1cmx, 1csk, 1asr, 1aug, 1axb, 1aok, 1zz, 1tc, 1vo, 1ri, 1bal, 2pd, 2tp, 2aan, 2cgb, 2cla, 2axf, 2awa, 2cel, 2cqi, 2le, 2cxy, 2bco, 2bay, 2cgr, 2bjx, 2ky, 2akb, 2iq, 3bx, 3co, 8jbl, 8hag, 8zu, 8aul, 8ajx, 8dfo, 8don, 8ldu, 8uk, 9bvz.

EAR8, Toloea, Spain.

1aac, 1ana, 1atj, 1abf, 1af, 1aap, 1ary, 1aik, 1ajo, 1ape, 1alk, 1ajg, 1aw, 1asy, 1axn, 1aqm, 1bul, 1bal, 1bkr, 1bdh, 1bkq, 1bxw, 1bzp, 1bhm, 1bzg, 1bdx, 1cmp, 1cbg, 1ckp, 1cab, 1eri, 1cak, 1cre, 1da, 1hn, 1hf, 1il, 1kt, 1pe, 1my, 1rd, 1sw, 1wl, 1xz, 1yb, 2abt, 2agb, 2awf, 2ag, 2brb, 2by, 2bt, 2bgg, 2bg, 2bum, 2blm, 2ber, 2bgi, 2ce, 2ev, 2eqo, 2eji, 2cgi, 2evj, 2exy, 2chk, 2cub, 2cns, 2cmm, 2lw, 2tp, 2sz, 2szk, 2ld, 2ruv, 3ab, 3af, 3adb, 3adp, 3ajd, 3aih, 3alx, 3adq, 3ari, 3awu, 3bta, 3bhv, 3bjp, 3chg, 3cbl, 3ca, 3cbv, 3lg, 3hh, 3hs, 3hg, 3ot, 3lw, 3oq, 3xe, 4jr, 4sa, 4tj, 4xe, 8ah, 8adg, 8bfe, 9aek, nkf, clar, q2by.

R. J. Evans, Vera Cruz, Mexico

1ber, 1bhm, 1gv, 1ow, 1pl, 1pm, 1py, 1wr, 1yb, 1xav, 1xu, 1xz, 2aey, 2jr, 2qd, 2rm, 2xv, 3ca, 3oe, 3jw, 4fm, 4ll, 4rr, 4xe, 4xr, 5acm, 5aiu, 5atf, 5ml, 5nj, 5nw, 5wp, 5zai, 6ea, 6ig, 6lj, 6qi, 8aly, 8aae, 8bac, 8bk, 8dia, 8drs, 8gz, 8zf, 8ze, 9bc, 9bht, 9bib, 9bme, 9brk, 9bse, 9bzg, 9bzo, 9cgn, 9clj, 9cuo, 9eyd, 9dq, 9dqu, 9il, 9oa, 9xa, 9xi, 9xn, 9xn, 9xw, NKF.

CANADIAN SECTION

(Continued from page 65)

Commercial OP he entered the Publicity Department of the Marconi Company, at Montreal, and in the meantime was operating c2AG—a powerful spark set. Shortly after this he became editor of Canadian Wireless Magazine, at that time Canada's only radio journal. Later he acted as Announcer and Studio Manager of the Marconi BC Station CFCF at Montreal. He was transferred to the Commercial Department of the same Company in the fall of 1923. In November of 1924 he entered the Montreal office of the Canadian Westinghouse Company in their Radio Department.

It is up to the amateurs to do their part. On the shorter wavelengths we should be able to beat our last year's record in working VDM. Who is going to have the honor of putting some good signals right up to the North Pole? There is going to be lots of competition as our English friends will be in on this too, as VDM was QSO England last year.[1]

We wish the Arctic, her officers and crew a safe and very pleasant voyage and we hope that by means of amateur radio we shall have the pleasure of keeping them in touch with the homeland.

1—For accounts of previous VDM trip see *QST* for July, October and December, 1924.

Communications

The Publishers of QST assume no responsibility for statements made herein by correspondents

Conditions in the 8th

(Editor's Note: For some months *QST* has been telling our membership about certain things that were rotten about their station operation and which needed immediate improvement. Here is an interesting but disconcerting letter from the Supervisor of the Eighth District, informing us of the amature situation as seen from his territory. The picture is anything but flattering. It is probably a fair cross-section of the country. The only way this situation can be remedied is by individual action by each amateur. Take this letter to heart.)

Office of Supervisor of Radio,
Federal Building, Detroit.

My dear Mr. Warner:

I acknowledge receipt of your letter of the 11th instant in which you state that Mr. Hebert in a recent conversation informed you somewhat on amateur radio conditions in this district.

During a convention of amateurs in Pittsburgh, Pa., I had the pleasure of meeting Mr. Hebert, and during our conversation I explained to him that this office had found it necessary to recommend the suspension or cancellation of a number of amateur station licenses.

I am very pleased to note from your letter that the A.R.R.L. is making a determined effort to reduce the amount of interference caused broadcast listeners by the operation of amateur transmitters. I take this opportunity of informing you of the amateur situation in this district as found on recent investigations.

The results of investigations recently made have most certainly not been complimentary to the amateurs in general. I find that probably no more than one station in ten has been erected with a suitable degree of care, and this point alone surprised me very much. It looked to me as if the owner of the station had just one point in mind, i.e., "How quickly can I build it," and not "How good can I make my station." I feel that you will be surprised to know that approximately eight out of every ten amateur transmitters inspected during the past three months have been closed by this office because of their persistence in the use of conductive coupling. I find that the amateur stations which do not have key thumps is rare indeed. I do not believe that the owner of such a station can offer much defense for having key thumps.

In view of the fact that the frequency bands allocated for the use of amateurs are very liberal, it would naturally be expected that the adherence to assigned frequencies be reasonably strict. However, it is not the case. I find amateur stations transmitting on practically all wavelengths from 60 meters to 210 meters, apparently with little regard for the regulations. For example, in less than one-half hour on the 16th instant we found three amateur stations phoning on 190 meters, and one of these was broadcasting music; one on 203 meters; two on 91 meters; one on 93 meters and one on 101 meters. Owners of amateur telephone stations seem to have a dislike for their assigned band of 170 to 180 meters, for few of them stay within the band.

Such, in general, is the situation in this district as found on personal investigation by me and my assistants. This office in one month receives hundreds of complaints against amateur interference filed by broadcast listeners. In every case when the complaint was sincere the amateur was found to be at fault. I was as much surprised over such a condition as you will be to read about it. The amateur transmitting station that meets the requirements of present day regulations seems at present to be an exception to the rule.

The American Radio Relay League has stated in its publication that it is possible to build an amateur transmitting station which when operated on short waves will not interfere with a broadcast receiver very close to it. I agree that such a station can be built, but I regret to state that I have yet to see such an amateur transmitting station in this district.

The amateur who is a sincere experimenter will find the greatest degree of coöperation offered him by this office in the solution of his problems. It is indeed unfortunate that the sincere amateur seems to be in a distinct minority, for certainly a conscientious experimenter would not attempt to operate some of the transmitters found in the majority of present day Eighth Radio District stations. I always try to encourage the performance of serious experiments, but when the careless amateur, and too many of them are careless, persists in using antiquated apparatus which does not meet with the requirements of the recently amended regulations, then

there is but one course for me to pursue and there is no choice in the matter—the amateur's station license must be cancelled or suspended.

I trust that my frankness in stating facts in this letter will not convey to you an incorrect impression of my attitude toward the amateur. As a matter of fact, I would like to see amateur transmitters capable of being operated through quiet hours, and for this reason I have recommended the proper use of compensated wav telegraphy.

I believe that further publicity in *QST* in regard to this deplorable situation would be of material benefit.

Respectfully,

S. W. EDWARDS,
U. S. Supervisor of Radio.

Wave Bands

144 Second Street,
Troy, N. Y.

Editor, *QST:*

The other night while listening in it occurred to me that it would be a very good idea if we could get the "gang" to use various wave lengths for different classes of work. Why not use the 150-200 meter band for all traffic which is local, say within 500 miles, and for any local work. The 75-80 meter band would be fairly clear then for dx work. We would have 40 and 20 meters for daylight work, either traffic or test. I think that if the gang could adopt some system like this for different kinds of communication we could all have a lot more fun. Make our sets work on all wave bands and rig up some quick wave change device so that we could QSY easily and quickly and then we could use the A or B system shown in April *QST*.

Last year a lot of fine dx work was done on wavelengths around 160 meters and there is no reason why it cannot be used for dx traffic now. Don't think that I am against the 75-80 meter band. I mean that 150-200 is fine business for traffic and if we use it for such the chances for dx on 75-85 meters will be much better.

John J. Long, Jr., 2SZ

Glass Insulators

2750 South 18th St.,
Philadelphia, Penna.

Editor, *QST:*

After seeing the description of the antenna at 9ZT I decided to try to make something like it. The insulators are made of three-eighths inch thick glass twenty-two inches long and three-quarters of an inch wide. To drill the glass a three cornered file and turpentine was used. Two of these glass pieces were bolted together by means of a bolt one inch long. The glass pieces were spaced one-half an inch by means of lock nuts on the bolt. This type of insulator is much stronger than the kind 9ZT uses.

Max Bonsted

The Underwriters' Rules

14 Upland Road,
Cambridge, Mass.

Editor, *QST:*

Noting the article in your last issue, by H. N. Pember I wish to add a few facts. Before I entered your ranks I had an antenna of 3 wires 60 feet long and 35 feet high, with no special lightning protection. This antenna was passed by the Insurance Company. Soon after I got my transmitting license the Insurance Exchange sent out their inspector and he informed me that I must have a lightning switch because I was transmitting. If I did not have any lightning protection before, why should I now?

The inspector also told me that I must have a separate line for my power from the meter. This house has been standing fifteen years. At the time it was built the meter was placed on the third floor. It has not been changed since. To bring BX from my set on the first floor to the meter would cost more than I could afford. Therefore the only alternative was to QRT.

The first time the inspector came he told me to connect on to the wires in the cellar. He must have known that the meter was on the 3rd floor for a glance at the outside wires would show the meter location. I obeyed orders and connected wires in the cellar. The second time the inspector came back he would not pass this. I pointed out that I had obeyed orders, and that it was impossible to go direct to the meter. Nevertheless, N.D. I then asked him if there was any fire risk? He replied, "Decidedly no." Then why won't he pass it? Because the law says that all power shall be taken direct from the meter for transmitting.

This law was made long ago, in 1912, when the spark was in use, and when the power drawn was of unknown quantity. It has not been changed since, to my knowledge, or the knowledge of the inspector. But I, with my little 75 watt Acme transformer, drawing much less power than some of the electric lights in the house, must follow these ancient rules. What is to be done about it?

H. K. MacKechnie, 1ADP

(Note—And how about the lightning switch on the counterpoise? Why on earth is it necessary to provide lightning protection on a counterpoise which is directly under a *grounded* antenna? Maybe lightning follows the Inverse Duplex System and starts from the ground up. We wish someone could eliminate some of these senseless "protection" Rules.—Asst. Tech. Ed.)

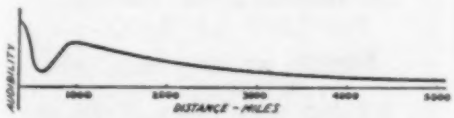
Local Audibility

Oberlin College,
Oberlin, Ohio.

Editor, *QST*:

I wonder how many of the gang have experienced the same effects as we have at 8ZE in regard to the strength of local and DX stations on the 75-85 meter band. First, from the transmitting side, 8ZE is reported by many of the West Coast stations to have a terriffic wallop, but at the same time great difficulty is experienced in QSO with 8RYY 20 miles south of Oberlin. One night while working 6CNL, who happened to be on the same wave as we were, 8RY reported that the signals from the coast were more QSA than those from 8ZE.

The same thing is true here on the receiving end. 8CYI, 8GZ, 8PL, 8BAU and a host of others—many of the most consistent on DX transmitting—are not near-



ly as loud as the West Coast stations they are working. The loudest signals received at any time are those from 500 to 1,000 miles distant.

As nearly as I can see it, there must be an audibility curve similar to the one shown with a minimum point of audibility corresponding to the local stations and a maximum following. Has anyone any dope on this?

E. W. Thatcher, 8ZE

Re One of Our Directors

Crowley, Louisiana

Editor, *QST*:

I just want to add a word of praise to a certain director of the A.R.R.L. who lives down in Chattanooga. During the first part of this year I got in communication with Mr. Benj. F. Painter by mail, as I wanted to become an amateur and didn't exactly know enough about this game to attain that grade. Mr. Painter came through to my rescue and with his aid I have managed to come to the point where all that is necessary is the application to the inspector. Mr. Painter has sure been a helpful friend and his patience can't be written about—it's there, because I have asked him more foolish questions and he has explained everything that I have ever asked for.

He is just a *real* ham, that's all. 73.

H. T. Duson

Arcless Keying

307 Cabot Street,
Newtonville, Mass.

Editor, *QST*:

Probably a large per cent of us place our keys in the negative high-voltage lead, and are troubled with arcing across the contacts of the key. I tried a condenser across there but instead of an arc the current gave vent to its feelings by a nice fat spark. I have always understood that if the key is placed in the grid circuit the plate current will heat the tube up and keep it that way, but when I changed to keying in the grid circuit I happened to leave a small fixed condenser of .001 μfd capacity across the key. I was surprised to notice that the plate current was practically zero when the key was up.

There is absolutely *no* sparking at the key, and practically all of the advantages of keying in the plate circuit are at the same time retained.

Henry S. Keen, 1AEL

A Radio Museum

805-63rd Ave.,
West Allis, Wisc.

Editor, *QST*:

The Milwaukee Radio Amateurs Club has started a collection of modern, obsolete and unique radio parts and equipment which is being assembled at the Milwaukee Public Museum where it will be permanently exhibited. This idea has met with the hearty co-operation of everybody and with the help of the "gang" we hope to have an exhibit which will really be an asset to the radio game.

We are asking you for any material whatsoever which would be of interest or value in such a collection. We all have old time "doohickies" and "whatnots" that the club would most certainly appreciate having. Due credit is given to contributors by placing a card on each exhibit.

—Sam Snead

Postage Rates on Cards

282 Union Ave.,
Williamsport, Pa.

Editor, *QST*:

Ever since the new regulations regarding increase in postage on different forms of mail went into effect I have noticed all my cards (QSL'S) bearing two cents. This is either misunderstanding or ignorance on the part of the "gang." The new regulations require two cents in postage on all post cards which are not government cards. On the government cards the one cent stamp which is printed on the card is sufficient postage. If the gang will have their QSL cards printed on government cards they will save one cent postage.

C. Raymond Bell, 8BFE

More QRN Storms

Searsport Avenue,
Belfast, Maine

Editor, *QST*:

I noticed in the May *QST* a letter from Mr. Biele regarding QRN storms and I wish to assure Mr. Biele that the North Pole and the Tropics are not the only places where this phenomenon is prevalent.

This spring has been very prolific in this wholesale QRN at this station. The roaring and escaping steam would start in shortly before a rain storm and continue more or less steadily throughout the storm. Very often a stream of short sparks would jump at the antenna switch. Similar QRN has been noticed in the summer preceding a hail storm. I think all the receivers in this latitude have the roaring sparkling kind of static during snow storms.

E. B. White, 1TC

Note:—A number of commercial operators report QRN of this type to be found very often at sea. Even when there is not a cloud in the sky, this hissing static will prevail for many hours, and it will be accompanied by large sparks which hop across the antenna series condenser in the receiver.)

Working Break-In

Oberlin College,
Oberlin, Ohio

Editor, *QST*:

Why in the name of time do the hams fail to realize that they can work "break-in" without any additional equipment? The use of this policy which has been followed with rather poor success at this station due to lack of cooperation, will result not only in less QRM, but will save power and patience—and may even save some poor ham's fist.

When a station calls *you*, whether after your CQ or after you have finished with another station, it is a 100 to 1 bet that his receiver is right on your wave. If he is not, he is going to hunt and fish around after he calls, with less possibility of getting you. Now, if you simply break in with a few "r r's" he can immediately sign and the result is speedy QSO. I have never seen the station at which distant stations signals cannot be heard while the transmitter is in operation.

Time and time again when a station has started to call 8ZE, I have picked him up on the first round, and time and time my R's remain unheeded. How abt it gang?

E. W. Thatcher, "gx".

(Note:—If the transmitting tubes are kept lit while receiving the tubes will oscillate merrily along even though there is no plate voltage on the tube (plate voltage from the high voltage transformer)—consequently reception on the wave length of *your* transmitter is usually impossible. A few meters off your wave reception is OK and the break-in works F.B. If the transmitting tube filament is turned off, when you come back at the other fellow you will be a little off your original wave until the tube heats up. But when you CAN work break-in with the other fellow, for the luv o mud *do it*. When handling traffic if he has QRM copying you, all he has to do is to hold down on the key and stop you right away—saving much time and many QTA's.—Asst. Tech. Ed.)

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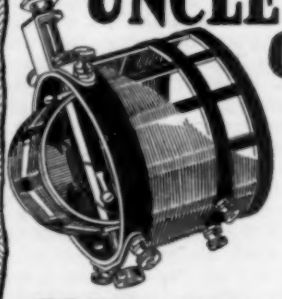
NEW LOW WAVE LOW LOSS UNCLE SAM COIL



SIZE
2⅞ x 2½ In.
Tunes from 35 to 150 meters with a.0005Mfd. Condenser.

FREE Ask your dealer or send us four cents in stamps for wiring diagrams in which this unit can be used.

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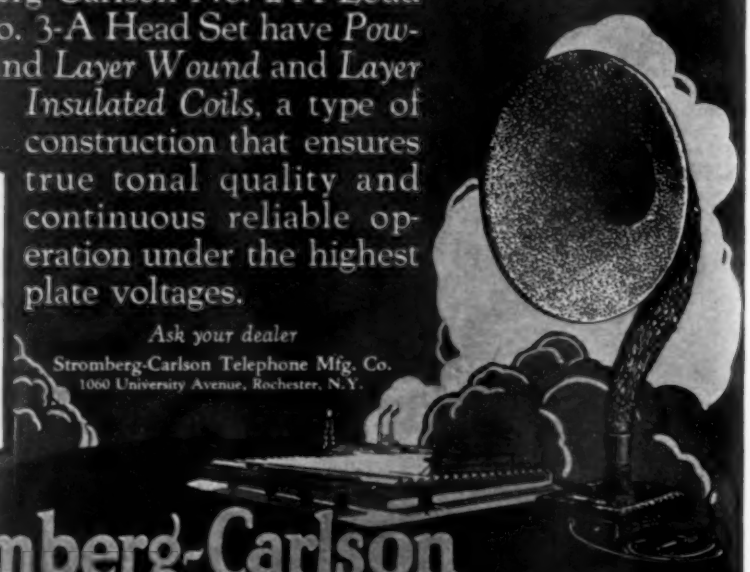

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Next Month's Issue

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PROFESSIONAL SET BUILDERS

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WE will shortly begin a series of newspaper advertisements, featuring the work of individuals and dealers who build sets using Cardwell Condensers.

If you build to specification or from original design, it will be to your interest to communicate with us immediately.

Ask for details of plan. Be sure to give name of your jobber.

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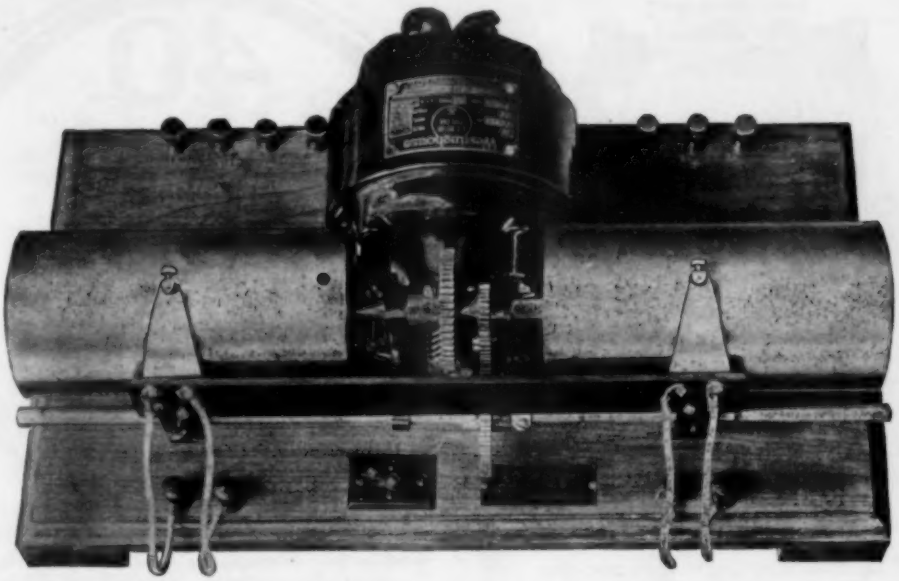
81 Prospect Street, Brooklyn, N. Y.

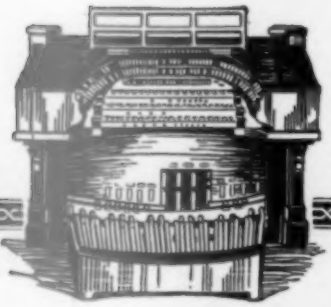


RADIO PICTURES

We are beginning now to find out what you radio experimenters want, and have put your suggestions into the new model machine, shown above. Not only is it complete for both sending and receiving pictures and picture-messages by radio (or by wire), but it is a beautiful piece of workmanship. The price to A.R.R.L. members is but $45—less than it costs. Why? Because we want your assistance in developing visual radio. But whether you buy a machine or not send for information about prizes for suggestions, for each of which a copy of the book "Radio Vision" is sent, whether you get in the cash prize lists or not. We are after helpful suggestions. Shoot 'em in, and we will do our part.

JENKINS LABORATORIES

1519 Connecticut Avenue **Washington, D. C.**



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Model 55, Walnut
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You can use the new Sangamo Mica Condenser to support long busbars, instead of using the busbar to support the condenser. Simply slip the bus through condenser terminals and solder. No cutting of leads. This is merely one feature demonstrating the wide flexibility of connections possible with Sangamo Mica Condensers.

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Solidly molded in smooth brown bakelite, the Sangamo Mica Condenser sets a new standard of neat compactness. It looks *finished* and actually improves the appearance of the set.

Made in all standard capacities with or without resistor clips. Prices are very reasonable.

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Springfield, Illinois

RADIO DIVISION, *50 Church Street, New York*

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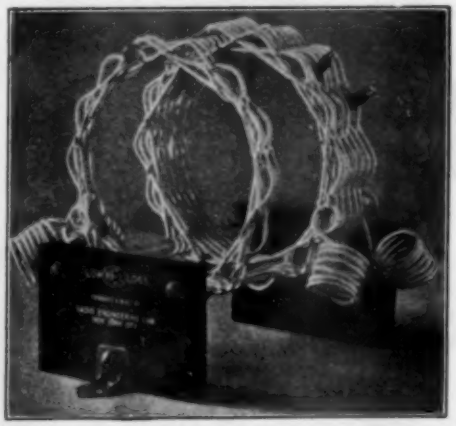

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For perfect results you must use AMPERITE for filament control. Price $1.10 everywhere.

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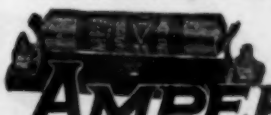

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Electrically and Mechanically

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Positive contact spring bearings provide a good connection with the rotor group and eliminate the disadvantages of a pig tail connection. Mechanically as well as electrically General Radio condensers are the standards of excellence.

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Cambridge, Mass.

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Total condenser losses at radio frequencies are the sum of conductivity losses, eddy current losses, and dielectric losses.

Conductivity losses most seriously affect the efficiency of a condenser under working conditions. They arise from poor contacts between plates and from poor bearing contacts. Soldered plates and positive spring bearings reduce these losses to a minimum.

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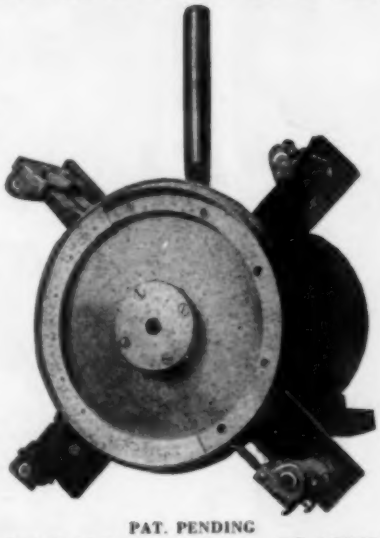
The Super-Sync is the only rectifier that delivers a pure D.C. tone and gives 100% rectification at all times.

It is the only rectifier that is adaptable to either high or low power sets as it easily handles up to 4,000 V. at 250 M.A.

The commutator on the Super is eight inches in diameter and is driven by a ¼ H.P. 110 V. 60 cycle 1800 R P M synchronous motor.



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The Super practically eliminates interference caused by other types of synchronous rectifiers.

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For Quality CORBETTS CABINETS For Quality

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Price List:

Size	Mahog- any finish	Walnut or Mahogany	Size	Mahog- any finish	Walnut or Mahogany	Size	Mahog- any finish	Walnut or Mahogany
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7x12-8	7.00	8.75	7x28-8	11.80	14.70	7x18-10	10.20	11.55
7x14-8	7.50	9.40	7x30-8	12.75	15.85	7x21-10	10.90	13.25
7x18-8	8.55	9.50	7x27-9	11.85	14.80	7x24-10	11.70	14.65
7x21-8	9.30	11.50	8x24-8	11.10	13.90	7x26-10	12.65	15.80
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in every receiver in his station. Back of this Grid Leak is dependability. It is manufactured with care, is noiseless and scientifically correct.

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amateur transmitting condenser

For amateur transmitting stations—the Dubilier Condenser No. 668. It may be used as a series antenna condenser; a plate blocking condenser or a grid coupling condenser in tube transmitters of 500 watts or lower.

Capacity .0001 to .075 Mfd. operating voltage 1000 to 3000 volts continuous at a current of 5 amperes—radio frequency of 750 to 1000 kilocycles.

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AMPLIFYING TRANSFORMERS

Standard on the majority of quality sets

SUB-PANEL MOUNTING TYPE THORDARSONS NOW ON SALE

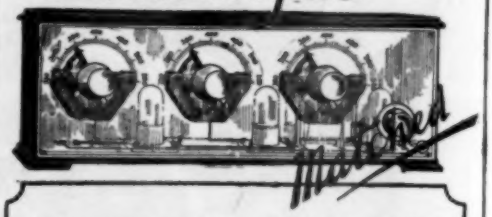
They permit a neater assembly, the shortening of leads and the concealing of wiring—as in factory built sets. Same ratios—same prices—as standard type Thordarsons. If dealer cannot supply order from us.

TYPES AND PRICES — Thordarson "Super" Audio Frequency Transformers are to be had in three ratios: 2-1, $5; 3½-1, $6; 6-1, $4.50. Thordarson Power Amplifying Transformers are $13 the pair. Thordarson Interstage Power Amplifying Transformer, $8. All Thordarson products are unconditionally guaranteed. Dealers everywhere. Write for latest hook-up bulletins — *free*.

THORDARSON ELECTRIC MANUFACTURING CO
Transformer Specialists Since 1895
WORLD'S OLDEST AND LARGEST EXCLUSIVE TRANSFORMER MAKERS
Chicago, U.S.A.

MATCHED DUPLEX CONDENSERS

Always Read Alike Because They Are~~



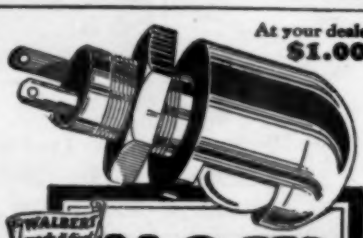
Just one number to log—or eliminate logging and dial by wave-lengths. Made as Bureau of Standards specifies, and guaranteed. Rugged, with wear-proof bearings. Built for accuracy. Packed in matched sets. Sealed, to remain untouched until used.

DUPLEX Matched condensers assure you the most out of your radio set. Ask your dealer.

Interesting illustrated folders on request.

DUPLEX CONDENSER AND RADIO CORP.
32 Flatbush Ave. Extension, Brooklyn, N. Y.

At your dealer $1.00



WALBERT

NOW

You can put your radio set in that convenient out-of-the-way corner without straining your eyes while tuning—

LIGHT UP

your panel with the

WALBERT
PANELITE

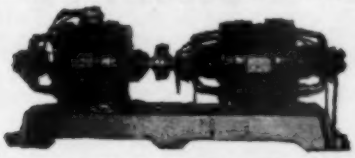
WALBERT MFG. CO., CHICAGO

Jewett Quality Products

The Superspeaker. The Superspeaker Console, The Vemco Unit, The Superspeaker Highboy, The Parkay Cabinet, The Micro-Dial

Jewett Radio & Phonograph Co.
5674 Telegraph Road Pontiac, Michigan

—at the end, the middle, and around the earth



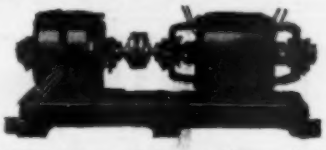
"ESCO" in the Arctic

In selecting "ESCO" Motor-Generators for the MacMillan Expedition to the Arctic this summer, Commander E. F. MacDonald, Jr., of the Zenith Company, writes: "—We have settled definitely on yours, after having considered all various Motor-Generators available."

"ESCO" supplied the expedition with two Motor-Generator sets, motors 32 volt, 2 HP, generators 2000 volt, 1000 watt. These were of a new design with distributed field windings—and they were in transit three weeks from receipt of order!

"ESCO" on the Equator

Captain Stevens, aerial photographer for Dr. A. Hamilton Rice's expedition to unexplored regions in the tropical Jungle North of the Amazon River basin in Brazil, said: "Altho working with portable apparatus and in the heart of the world's greatest forest, a record was made in exchanging the first wireless messages to pass directly from South America to England and back again. Long-wave communication was carried on between the expedition and Manaos and short-wave communication to many parts of the world, including New York, San Francisco, London, Rio Janeiro and New Zealand. The signals were reported as very strong, both in New York and London." The A. Hamilton Rice expedition was equipped with "ESCO" Dynamotors.



"ESCO" spans the Antipodes

WAHG announced that a cablegram had been received from St. George Barlow in Australia saying that the Locomotive Bell, the Nassau Club Orchestra, and the singing of Walter J. Neff had been heard in Melbourne and that WAHG would receive a silver trophy for its sending feat. At about the same time it was announced, Loyd Jacquet, American representative at the International Amateur Radio Convention, now in Paris, cabled that the Richmond Hill entertainment had been heard there. These messages from Australia and Paris showed that WAHG had covered a span of 15,000 miles.

WAHG was using a standard "ESCO" Item 20.

"ESCO" is the pioneer in designing, developing and producing Generators, Motor-Generators, Dynamotors and Rotary Converters for all Radio Purposes.

HOW CAN **"ESCO"** SERVE YOU?

ELECTRIC SPECIALTY COMPANY

TRADE **"ESCO"** MARK

225 South St. Stamford, Conn.

FILAMENT AND PLATE TYPES

TRANSFORMER BUILDERS

FAMOUS "B H" TRANSFORMERS

BUILT TO THE HIGHEST MODERN STANDARDS

Used by the Leading Amateurs of Canada

WRITE FOR LITERATURE

Benjamin Hughes Elec. Co.

298 Lagauchetiere St., W. MONTREAL, CAN.

AUDIO AND PUSH PULL

SINCE 1910

BLUEBIRD TRANSMITTING TUBES . . *Type 202 5 Watt* **$3.00**

The Popular transmitting tube used by thousands of Amateur Broadcasters. Quality and Satisfaction GUARANTEED. **Shipped Parcel Post C. O. D.**

BLUEBIRD TUBE COMPANY

Dept. T 200 Broadway New York City

Immediate Delivery!

ON ALL AMRAD PRODUCTS

AMRAD "S" Tubes 4000-1 (1000 Volt) $10.00
AMRAD "S" Tubes 5000-1 (400 Volt) 6.50
AMRAD No. 2834 Change Over Switch 6.50
AMRAD 36 MFD. MERSHON CONDENSER 8.00

Transmitting Accessories

U. V. 202, 203, 203A, 204, 204A, Tubes

At Special Prices

SPECIAL 5 WATT TRANSMITTING TUBE $5.00

Guaranteed at least 750 Volts adaptable for shore wave - - - - - - -

Allen Bradley Radiostats

Jewell Meters — Weston Meters

Cardwell Transmitting and Receiving Condensers

General Radio Laboratory and Experimental Apparatus

Low Loss Short Wave Transmitting Inductances

Bakelite Panels Drilled and Engraved for Transmitters

RCA, Acme, Thordarson, Amrad, Telefunken Plate and Filament TRANSFORMERS

Pyrex Insulators from 3¼ to 32" Sizes

Western Electric V.T.1 and V.T.2 Tubes—$6.00 each

Transmitters built to specification for Phone, C. W., I.C.W. and spark of any size or power

Write for New Detailed List No. 2 for New Specialties Too Numerous to Mention

Troy Radio Company

1254 St. Johns Place Brooklyn, New York

More Distance!

—and mellower tone

with the new improved

ADVANCE "SYNC" RECTIFIER

This Rectifier gives surprising results. Rectifies alternating current at 500 to 3000 volts to direct current for the plates of your transmitting tubes. Very efficient on short waves. Puts more energy into the antenna and counterpoise on account of actual copper-to-copper contact in rectification. Requires no attention—always ready to go and will never slip a pole. Insures true, mellow tone transmission. Thousands of ADVANCE RECTIFIERS in use in American Radio Relay League.

Revolving disk is moulded bakelite six inches in diameter. Nickel plated brush holders with adjustable gauze copper brushes. Convenient control handle. Disk, aluminum brush arm support and brush holders perfectly insulated.

Price complete with Westinghouse ⅛ H. P. Synchronous Motor $40

Rectifying wheel with complete brush assembly and mounting ring to fit your own motor..... $15

WE PAY ALL TRANSPORTATION CHARGES IN U.S.A.

ADVANCE ELECTRIC CO.

1260-1262 West Second St., Los Angeles, California

Our Type A Wave Meter is Ready

Send for Literature

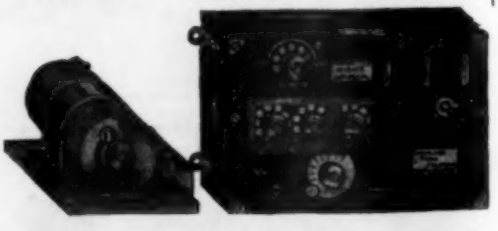
Other Real Ham Apparatus Under Way

We are specialists in apparatus for the amateur and want every real ham's name on our permanent mailing list. Send 25 cents for registration and a copy of our illustrated loose leaf perpetual catalog, now in preparation.

THE WIRELESS MFG. CO.

Canton - - - Ohio

Western Electric **Portable Navy Telephone Transmitter and 3 Tube Receiver Complete**



Consists of Transmitter and Receiver Cabinet, Microphone, Head Set, 12V. to 250V. Dynamotor and Cable. Price without tubes or batteries, $50 (new ones), $40 (used ones), *Express Paid.*

Other Navy Apparatus at *Special Summer Prices.*

Geo. W. Eaton Electric Co., 1915 S. 12th St., Phila., Pa

To Our Readers Who Are Not A. R. R. L. Members

Wouldn't you like to become a member of the American Radio Relay League? We need you in this big organization of radio amateurs, the only amateur association that does things. From your reading of *QST* you have gained a knowledge of the nature of the League and what it does, and you have read its purposes as set forth on page 6 of every issue. We would like to have you become a full-fledged member and add your strength to ours in the things we are undertaking for Amateur Radio, and incidentally you will have the membership edition of *QST* delivered at your door each month. A convenient application form is printed below—clip it out and mail it today.

.....1925

American Radio Relay League,
Hartford, Conn.

Being genuinely interested in Amateur Radio, I hereby apply for membership in the American Radio Relay League, and enclose $2 ($2.50 in foreign countries) in payment of one year's dues. This entitles me to receive *QST* for the same period. Please begin my subscription with the .....issue. Mail my Certificate of Membership and send *QST* to the following name and address.

.....

.....

.....

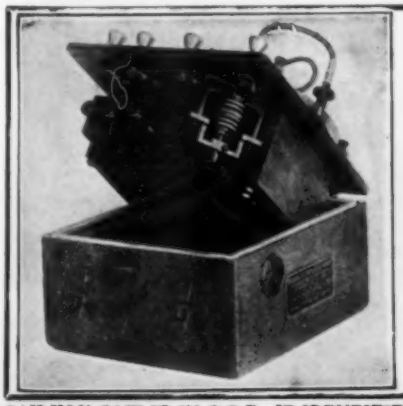
Station call, if any .....

Grade Operator's license, if any .....

Radio Clubs of which a member .....

Do you know a friend who is also interested in Amateur Radio, whose name you might give us so we may write him about the League? .....

. ..... Thanks!



RADIO SPARK TRANSMITTERS (75 WATT PORTABLE)

Made for U. S. Army Aeroplanes

This is a tuned spark coil transmitter, with a wave length of 100-300 meters. The set is made of the finest of materials and the essential parts are the spiral tuning inductance, the induction coil, sending condenser and spark gap. Can easily be converted into spark coil CW set. Brand new, in original cartons.
ORIGINAL GOVERMENT COST, $47 EACH

OUR PRICE $5.75 EACH

AMERICAN SALES COMPANY
21 Warren Street New York City

Doll Up The Front End

To say nothing of giving an air of distinction to your car, the A.R.R.L. Automobile Emblem tells the motoring world *who you are*. You'll be greeted with a friendly toot by low-loss lizzies and DX Dusenbergs as they spy the gold and black trade mark of a real ham rolling down the road.

Only A.R.R.L. Members can get this 5 x 2½" emblem, heavily enameled on sheet steel base, holes top and bottomside for handy rigging—postpaid for 50c.

The American Radio Relay League, Hartford, Conn.

YOU

don't have to play second fiddle. You can have the most highly selective receiving set in the world, together with coast-to-coast reception at a moderate cost.

Furthermore, the Superheterodyne gives better results than any other circuit during warm weather. Build now for summer entertainment and to be prepared for fall.

Our booklet "Building the McLaughlin One-Control Superheterodyne" gives full constructional data and exact size working blueprints.

Order from your dealer or from

Precise Manufacturing Corp.

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Get Cuba

While Big Local Stations Are Broadcasting, The New York Evening World got 46 stations in **One Evening**, including Cuba, Mexico City, Dallas, Los Angeles, and Porto Rico; while testing the wonderful sensitivity of the

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For All Circuits

New in Principle—New in Design

Insist on getting them, if your dealer can't supply you, send your order to us. Satisfaction guaranteed or money back.

Price $4.00, All Types

Send for Free Diagrams

A wonderful interesting book **"Radio Frequency Amplification,"** contains popular and technical information with many up-to-date R. F. circuit diagrams of greatest interest to both radio user and engineer. **25c postpaid.**

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BLUEBIRD RADIO TUBES

—are powerful—sensitive for distance, give clear volume and long service.

GUARANTEED

to work in Radio Frequency, Neutrodyne, Super Heterodyne and Reflex.

WITH BAKELITE BASE

Type 200
Type 201A
Type 212
Type 299
Type 299A with standard base

$2.00

Type 202 5 watt Transmitter $3.00

When ordering Mention Types

Shipped Parcel Post C. O. D.

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Laboratory Product

CRESCENT LAVITE RESISTANCES

for Distortionless Amplification

12,000, 48,000, 50,000, 100,000 Ohms. List $1.50 ea. Special Sizes to Order $2.50 ea. Dealers write for discounts. When Better Resistances are made they will be Crescents.

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It Tunes!

$7.50 List

Tune in "distance" with the volume of a "local"

That is one of the many reasons why Selec-Tran is winning the favor of the "fan".

Its broad tuning capacities enable your set to break through the maze of interference—to give unlimited performance, regardless of conditions, thereby guiding reception to its utmost clarity and beauty of reproduction.

Selec-Tran was especially designed for Super-Hetrodyne circuits and is adaptable for use in standard vacuum tube sockets, panel mounting or for soldering to permanent connections.

Selec-Tran entirely eliminates all inter-set distortions and atmospheric interferences; assuring greater selectivity across the entire wave-band.

We also present Selec-Tran AUDIO Frequency transformer, 7-times-tested and beautifully finished in Orange and Black.

Selec-Tran A. F. 3 to 1 3½ to 1 $5.00 List

If your dealer cannot supply you—write us.

Send for Catalogue

Adaptable for use in Vacuum Tube Sockets

Bakelite shielded-moisture-proof

SAMPTER RADIO CORP.

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"Windham" Wire Former

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A complete and handy tool for electricians, radio set builders and mechanics. It will accurately form loops or eyes for No. 4, 6, 8 and 10 screws, make easy radius and sharp right angle bends, has flat jaws and wire cutters. This tool is made of the best quality steel, dropped forged and carefully tempered in oil.

We guarantee every tool against defects in workmanship and materials and will promptly replace or refund money on any found defective by purchaser.

Price $1.25 Each

Ask your dealer

MANUFACTURED BY

THE GOYER COMPANY

Willimantic, Connecticut

The 100% Self-Shielded Transformer

has made a big hit with both set makers and set manufacturers because of its small size, its amazing volume and most of all, because of its **pure undistorted tone.** It is half the size of other transformers, but its results are unsurpassed. Absolutely new and scientific design and construction. Ratios 1 to 3, 1 to 4, 1 to 5 $3.50. Ratio 1 to 10 $4.50.

SEND FOR BULLETIN No. 94. Read all the exclusive features of this and other Premier Parts. Tells how to get free hook up diagrams beautifully printed in two colors.

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PREMIER *Quality Radio Parts*

EAGLE

Licensed by NEUTRODYNE

RECEIVING SETS MEAN SATISFACTION

Every "Eagle" Receiving Set is individually inspected *eight times* before it leaves the Eagle factory.

95% Eagle Built

Durable Balanced

Guaranteed

EAGLE RADIO COMPANY

EAGLE RADIO COMPANY

23 Boyden Place Newark, N. J.

A. R. R. L. Members -- What about your friends?

You must have a friend or two who ought to be members of our A.R.R.L., but aren't. Will you give us their names, so that we may write to them and tell them about the League and bring them in with the rest of us? The A.R.R.L. needs every eligible radio enthusiast within its ranks, and you will be doing your part to help bring this about by recommending some friends to us. Many thanks.

.....1925

American Radio Relay League,
Hartford, Conn.

I wish to propose

Mr. ..... of .....

Mr. ..... of .....
Street & No. Place State

for membership in the A.R.R.L. I believe they would make good members. Please tell them the story.

.....

.....

Clarity and Tone Range
With Kellogg Transformers

The reproductions of the highest tones as well as those of the lower extreme of the scale, with faithful, pure quality, is essentially the spirit of Kellogg Transformer design.

The Kellogg radio frequency transformer is of the low loss type, having many important features. It will operate at all wavelengths with .00035 to .0005 variable condensers. For best results, use the Kellogg .0005 low loss variable condenser. Kellogg R. F. Transformers at all dealers—$2.35.

Kellogg Audio frequency transformers give greater volume with clearer reproduction, due to the high quality materials and expert workmanship, used in the Kellogg process of manufacture. Kellogg audio frequency transformers are made in both shielded and unshielded types ranging in price from $3.50 to $4.50.

Kellogg transformers can be obtained at all radio dealers.

Kellogg Switchboard & Supply Co.

1066 W. Adams St., Chicago, Ill.

ROICE RADIO TUBES

"Royalty of Radio Tubes"

Produce clear volume—Highly sensitive for distance reception

EVERY TUBE GUARANTEED

To work in Radio Frequency, Reflex, Neutrodyne, Super-Heterodyne

Type 200
Type 201A
Type 212
Type 299
Type 299A with standard base

$2.00

ALL TYPES

Type 202 5 watt Transmitter $3.00

Shipped Parcel Post C. O. D.
When ordering mention type

Roice Tube Co.

21 Norwood St. Dept. 5 Newark, N. J.

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363 Hobart Building, *San Francisco, Cal.*
218 Van Nuys Building, *Los Angeles, Cal.*

Books and Information on Patents and Trade Marks by Request.

Assuring Radio Success

THE Weston Radio Table Voltmeter, Model 489 is especially designed for radio use. Its two ranges 7.5 and 150 volts, its eighteen inch flexible cables, its auxiliary pin jacks are all radio essentials.

The pin jacks may be conveniently and easily mounted on the panel and permanent connections made to those points of the circuit which you desire to test for voltage most frequently.

The flexible cables will enable you to make all the miscellaneous voltage and continuity tests necessary.

Complete instructions for making various circuit tests accompany each instrument.

Write for the booklet "Weston Radio Instruments;" it contains valuable information.

WESTON MODEL 489
Radio Table Voltmeter

WESTON ELECTRICAL INSTRUMENT CORP., 158 Weston Ave., Newark, N. J.

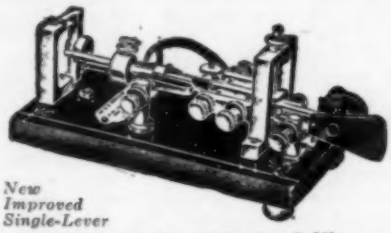
STANDARD THE WORLD OVER

WESTON

Pioneers since 1888

Martin's New and Improved VIBROPLEX

Reg. Trade Marks Vibroplex Bug Lightning Bug



New Improved Single-Lever
Japanned Base, $17 Nickel-Plated, $19

Transmits perfect signals at any desired speed. Easy to learn and operate. Saves the arm. Used and recommended by more than 85,000 wireless and commercial operators.

Special Large Contacted Vibroplex

Equipped with 3-16 inch contact points to break high current without use of relay ....$25.

Sent on receipt of price

THE VIBROPLEX CO. Inc.
825 Broadway, New York ***Established 1890***

KENOTRON RECTIFYING TUBES (Type TB-1)

Manufactured by the General Electric Co., new, in original cartons.

These tubes have a filament terminal voltage of 7.5 volts, operate on a filament source voltage of 10 volts and an A.C. input voltage of 550 volts. Their normal output is 20 watts at 350 volts D.C.

Eliminate your transmitting plate supply troubles with these tubes.

Make your own B-Battery eliminator with two of these Kenotrons and a suitable filter.

And the bargain price, OM, is only **$1.50 Each**

AMERICAN SALES COMPANY 21 WARREN ST. New York City

HAM-ADS

IMPORTANT NOTICE! NEW RATES ADVANCED CLOSING DATE

—

Effective with May QST, the HAM-AD Advertising Rates are TEN CENTS A WORD. Name and address to be counted, each initial counting as one word. These rates are shown on QST Rate Card No. 6, in force with the May issue.

The closing date for HAM-ADS is now THE TWENTY-FIFTH OF THE SECOND MONTH PRECEDING DATE OF ISSUE. For example, all HAM-ADS for the June issue must be in this office not later than April 25.

Hereafter no HAM-AD will be accorded any particular or special position.

Rates for the QRA Section remain the same; 50c straight. See heading of that section for details.

TELEGRAPHY — Morse and Wireless — taught at home in half usual time and at trifling cost. Omnigraph Automatic Transmitter will send, on Sounder or Buzzer, unlimited messages, any speed, just as expert operator would. Adopted by U. S. Govt. and used by leading Universities, Colleges, Technical and Telegraph Schools throughout U. S. Catalog free. Omnigraph Mfg. Co., 13M Hudson St., New York.

MAKE $120 WEEKLY IN SPARE TIME. Sell what the public wants — long distance radio receiving sets. Two sales weekly pays $120 profit. No big investment, no canvassing. Sharpe of Colorado made $955 in one month. Representatives wanted at once. This plan is sweeping the country—write today before your county is gone. OZARKA, 853 Washington Blvd., Chicago.

EXCHANGE: Cameras and kodaks, all sizes, for Radio Sets or parts. Rexford De Tompkins, Ottawa, Ill.

MOTORS—New G.E. ¼HP $12.50 ½ HP $28.50 1 HP $45. GENERATORS Radio Transmission 500V $28.50 Battery Chargers—Farm Lighting generators all sizes. Lathes, Drill Presses, Air Pumps other Garage and Shop equipment. Wholesale Prices. New Catalog. MOTOR SPECIALTIES Co., Crafton, Penna.

WHILE THEY LAST — Reinarts's original short wave articles in September, October and November numbers of Amateur Radio. Sent postpaid for 50 cents or free with a subscription $2.00. Executive Radio Council, 136 Liberty St., New York, N. Y.

REBUILD YOUR NEUT—Use same panel, same parts. No neutralization. 22 feet gold wire, only extra part, circuit and complete, simple instructions—$5.00 prepaid. Hundreds of Neut owners use this Kit. Details — 10c. 48 page catalog parts—10c. Stamps accepted as cash. KLADAG RADIO LABORATORIES, KENT, OHIO.

ESPERANTO! Learn Esperanto and communicate with Radio Fans all over the world. Our free sample lesson contains over hundred illustrations and demonstrates how easily this language can be learned. Send for it now. Benson School of Esperanto, Inc., 20 Mercer St., Newark, N. J.

OUR COMPLETE RADIO FACTORY AT YOUR SERVICE for the CONSTRUCTION OF EXPERIMENTAL APPARATUS. Laboratory "drivers," Wave meters, CW outfits, etc. Machining, drilling and engraving. Estimates cheerfully given. Clendinning Radio Products, Inc., 78 Watts Street, N. Y. City.

TENSHUN HAMS: WE DO NOT CUT PRICES, GIVE DISCOUNTS, OR HOLD SPECIAL SALES, TO GET YOUR BUSINESS. THERE'S NOTHING WRONG WITH THE APPARATUS WE OFFER FOR SALE, THEREFORE, IT IS UN-NECESSARY. YOU ARE GIVEN POSITIVELY THE BEST MERCHANDISE IT IS POSSIBLE FOR US TO BUY, AND YOUR ORDER IS SHIPPED THE SAME DAY IT REACHES US. WHAT MORE CAN WE OFFER YOU? GUARANTEE IMMEDIATE SHIPMENT AMRAD 8 TUBES, PRICE $10.00 AND PORCELAIN BASE TO MATCH 85c. NOW HAVE PLENTY OF THIS HERETOFORE SCARCE ARTICLE. CHEMICALLY PURE SHEET ALUMINUM 90c SQUARE FOOT AND SHEET LEAD 75c. WHAT COULD BE BETTER THAN A RUST PROOF ANTENNA? THE ANSWER IS NO. 12 SOLID COPPER ENAMELED WIRE. SELLS FOR CENT A FOOT, WE CUT ANY LENGTH. OHIO BRASS INSULATORS GIVE MAXIMUM INSULATION, AT MINIMUM COST. TWO SIZES $1.50 AND 75c. NAVY TYPE KEYS, BUZZERS, FILTER CONDENSERS, ACME TRANSFORMERS, FILTER CHOKES, MOTOR-GENERATORS, AND POWER TUBES. BUY YOUR RADIO GOODS FROM QST ADVERTISERS, AND REMEMBER THE ONLY HAM STORE IN THE FIFTH DISTRICT APPRECIATES YOUR PATRONAGE. FORT WORTH RADIO SUPPLY CO., FORT WORTH, TEXAS.

NEW IDEAS WANTED. Well known Radio Manufacturer whose products are nationally advertised and sold everywhere wants new Radio device to sell. Will pay outright or royalty for idea or invention which is really new and saleable. Address: Mr. R. F. Devine, Room 1101, 116 West 32nd St., New York, N. Y.

THE PERFECT PLATE SUPPLY FOR ANY SET—AN EDISON B (8ML KIND). NICKEL CONNECTORS ELECTRICALLY WELDED. 54 VOLT $8.25. 100 VOLT $15.00. OTHER SIZES. OAK CABINET. LARGEST ELEMENTS. REAL EDISON SOLUTION. A BIG 2000 MILLIAMP HOUR B FOR THE MULTITUBE SET, 105 VOLTS $24.00. CELL PARTS 17c, DRILLED 19c. ASSEMBLED CELLS 24c. QUANTITY DISCOUNTS. EDISON A ELEMENTS 5c, WELDED PAIRS 7½c. 3000 MILLIAMP HOUR SUPERCELL 33c. ANNEALED TEST TUBES ¾" 3c, 1" 4c. SHOCKPROOF JARS 1 x 6—4c. 1¼ x 6¼—5c. PUREST SOFT .032 NICKEL 1c FOOT. RUBBER SEPARATORS ½c. REAL EDISON ELECTROLYTE, $1.25 MAKES 5 LBS. WILLARD COLLOID—A REAL B CHARGER. 50 VOLTS $2.00. JUMBO $3.00. 100 VOLT FULL-WAVE $4.00. JUMBO FULL-WAVE $6.00. FOR HIGHEST INPUT AND OUTPUT EFFICIENCY USE NO. 12 ENAMELED AERIAL WIRE — 75c 100 FT. OHIO BRASS, WET PROCESS PORCELAINS, AND PYREX INSULATORS. A NEW QST LEADIN INSULATOR—PYREX—NEW PRICE $1.50. DRY EGGS 25 — $2.00. ANYTHING YOU NEED. RADIO 8ML. FRANK M. J. MURPHY, 4837 ROCKWOOD RD., CLEVELAND, OHIO.

SELL Amrad Receiver, Jewell Test Set, Jewell Trio, Jewell 1000 voltmeter, General Radio Laboratory Condenser, Decade Resistance Box, Audibility Meter, Wave Meter, Honeycomb Coils, DL100 to DL1500. 9AAL, 4602A Delmar, St. Louis, Telephone, Main 326.

---

20 WATT Transmitter — 4UV202's, condensers, transformers, rectifiers, filter meters, etc. $50.00. 9BBE.

ROICE 5-WATT DX BABY $3.00. CURTISS-GRIFFITH, FORT WORTH, TEXAS.

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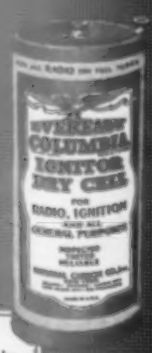

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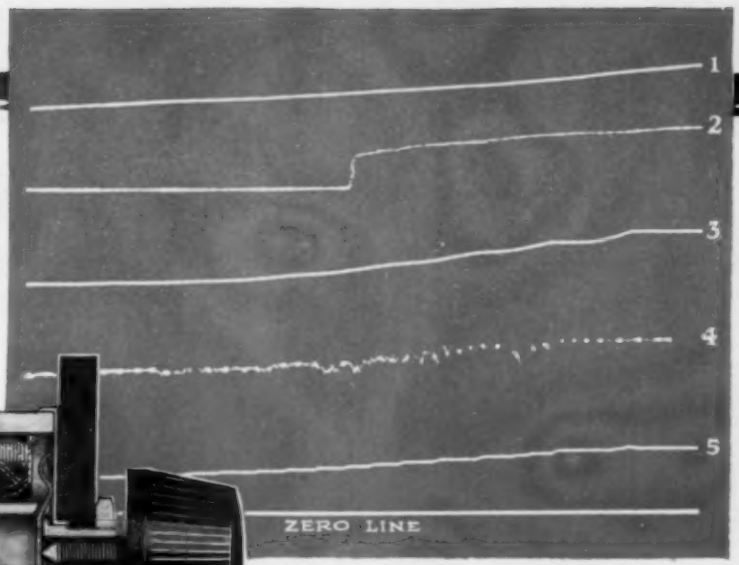
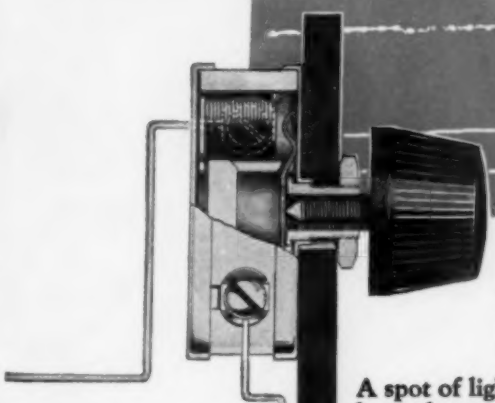
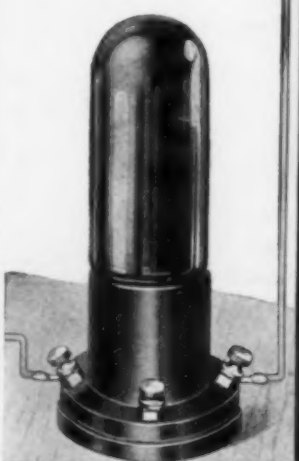




Use the same Bradleystat for ALL Radio Tubes without changing connections.



Only Graphite Discs

provide noiseless filament control

A spot of light, silently guided by an automatic electric oscillograph, traced the above curves on a moving photographic film. The test, made at the University of Wisconsin, was impersonal and impartial. The result, however, proves beyond a doubt the superiority of the Bradleystat for radio filament control.

The first line (No. 1) shows the silent, stepless variation produced by the Bradleystat. The following curves (Nos. 2, 3, 4, and 5) were produced by other types of rheostats, some using loose powder instead of graphite discs. See the scratchy, noisy control. Every jog in the white lines means a distracting noise in the loud-speaker.

Is it any wonder that Bradleystats are being substituted for ordinary rheostats by thousands of set owners? Try one, yourself, and hear the difference!

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